

# Nature *Magazine*

NOVEMBER  
1957

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NUMBER 9

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## NATURE MAGAZINE



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## Reviews

### The North American Deserts

By Edmund C. Jaeger. Stanford, California. 1957. Stanford University Press. 308 pages. Illustrated. \$5.95.

For forty years Edmund Jaeger has explored deserts—the Chihuahuan, Sonoran, Navahoan, Mohavean and Great Basin. He has become an outstanding authority on the flora and fauna of these areas, and has written widely about deserts. In this latest book, however, he brings together the story of five deserts, which have characteristics in common but nevertheless are different in many ways in their geology, animal and plant life, and climate. There is a fascination inherent in desert areas and they hold a growing allure in proportion to one's acquaintance with the life that has adapted to such regions. While Mr. Jaeger's book might be described as a "key to deserts," since it describes and pictures their flora and fauna, it is more than that, for the text is popular and the reader finds himself sharing the author's enthusiasm for the arid areas about which he writes so knowingly.

### Our National Parks

By Nelson Beecher Keyes. New York. 1957. Doubleday and Co. 216 pages. Illustrated. \$1.95.

In this volume in "The Real Book about" series being brought out by this publisher, the author directs his text to an audience of young people. More and more youngsters are becoming acquainted through vacation travel with one or more of the units in our system of National Parks. A visit to one park must inevitably stimulate interest in other areas in the same classification. Also knowledge of our parks is, or should be, a part of study in geography and social sciences, and this book will serve as collateral reading wherever the curriculum includes consideration of these areas.

### Soil Savers

By C. B. Colby. New York. 1957. Coward-McCann Inc. 48 pages. Illustrated. \$2.00.

The work of the Soil Conservation Service of the U.S. Department of Agriculture provides the inspiration for this book. It is a dominantly pictorial treatment of the soil conservation story, simplified and intended to introduce youngsters to this important field of conservation.

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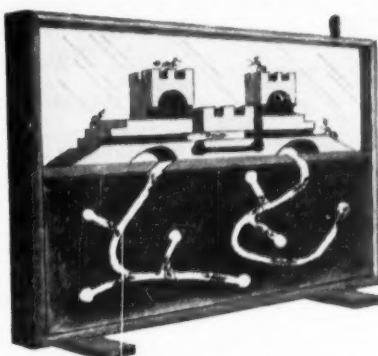


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# Nature Magazine

NOVEMBER, 1957 VOL. 50 NO. 9

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## Reviews

### The Atlantic

By Leonard Outhwaite. New York. 1957. Coward-McCann, Inc. 479 pages. Illustrated with maps. \$6.50.

Although he is an archeologist, anthropologist and administrator, Leonard Outhwaite's special passion is pursuit of the sea. Among his seafaring experiences is an Atlantic voyage in an eighty-foot schooner that covered 14,000 sea miles. Thus he and the Atlantic Ocean are on quite intimate terms, and it is logical that he should write this "biography of an ocean." In readable prose the author gives us the main facts about this ocean, and establishes its place in history and man's relationship to it through the years of exploration that followed on discovery. He traces the development of trade and discusses the societies and nations that have grown up along Atlantic shores.

### Hunting with the Camera

By Allan D. Cruickshank, Charles E. Mohr, Edward S. Ross, Herman W. Kitchen and Rutherford Platt. New York. 1957. Harper and Brothers. 215 pages. Illustrated. \$4.50.

All five of the authors who contribute to this book, edited by Mr. Cruickshank, are noted and accomplished photographers of wild plant and animal life. The techniques that they have learned and developed are the result of long field experience, ingenuity and imagination. Their adventures with a camera are fully as exciting as those of others who go afield for other purposes. Beside the fact that they leave their prey alive, these photographers have made lasting contributions to general and scientific knowledge of the wild and its plants and creatures. This book provides fascinating reading and also much practical advice for the camera hunter who makes this activity a calling or a hobby.

### Monkey Business

By Irving Adler. New York. 1957. The John Day Company. 128 pages. Illustrated by Ruth Adler. \$2.95.

This interesting little book does not deal with the apes but with hoaxes in the field of science. Since Science questions all ideas in search for the truth, it would seem that hoaxes would be difficult to achieve. This book proves that this is not so, although such frauds are of short duration and have a special if wry

humor. "Moonshine from the Sun" is the title of Mr. Adler's first chapter, which deals with flights of imagination indulged in by the *New York Sun* in 1835, imputing to Sir John Herschel discoveries about the moon that were definitely moonshine. Another hoax described is that surrounding the "finding" of Piltdown Man. Here is a most entertaining book.

### California Coast Redwood

Compiled by Emanuel Fritz. San Francisco. 1957. Foundation for American Resource Management. 267 pages.

This is an annotated bibliography of the coast redwood, *Sequoia sempervirens*, about which an amazing amount has been written. The compiler, who is Professor of Forestry, Emeritus, at the University of California, dedicates his book to "Chief Sequoyah, inventor of an alphabet for the Cherokee Indians and for whom the genus *Sequoia* was named." Bibliographical references are broken down into general works, reference works, the redwood in fiction and poetry, history, botany, management, lumbering, processing and utilization, and recreation and esthetics. In the author's index we find reference to an article we wrote in 1925, following our first visit to the coast redwoods in the company of Newton Drury, then of the Save-the-Redwoods League. R.W.W.

### Briefly Noted

*Antarctic Hazard.* By W. Ross Cockrill. New York. 1957. Philosophical Library. 230 pages. Illustrated. \$4.75. A book on the whaling industry that plays down the mysterious and melodramatic.

*A Book of Contemplation.* By Dagobert D. Runes. New York. 1957. Philosophical Library. 149 pages. \$3.00. A philosopher and writer about philosophy provides a little book of epigrams that are stimulating whether you agree with them or not.

*This Is the West.* By Robert West Howard. New York. 1947. New American Library. 240 pages. \$3.50. A Signet Book presenting life, lore and legend of the West.

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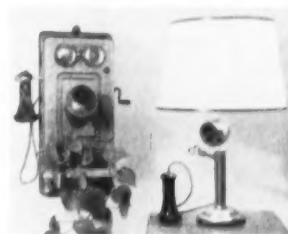


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# Nature IN PRINT

By HOWARD ZAHNISER

## Lake Solitude Sermon

BOOKS AND THEIR AUTHORS not only enrich and enliven our indoor hours

and days by bringing the outdoors in, reminding us in our urban surroundings of the still living wilderness, but they allow us thus in our arm-chairs to experience vicariously or in memory the tonic benefits of wildness. They also can enrich and enliven the actual experiences which we ourselves have in the outdoors, even in scenes of the greatest majesty and almost ultimate wildness. Who carries in his mind—or perchance in his pocket or knapsack—the expressions of great minds that have come to us through literature has with him texts that deepen the meaning and lift the exultation of the very greatest and most exquisite experiences.

I have thought of this repeatedly as I have remembered my early awakening one Sabbath morning this past summer along the shore of Lake Solitude, high in the midst of the Bighorn Mountains in Wyoming, in the Cloud Peak Primitive Area. As I looked through the open flaps of my tepee tent that morning, alone, I awakened to a world of wilderness so bright, so lovely, so peaceful that its exquisite quiet was itself so exciting that I could hardly keep from disturbing it myself. The air was still. The lake was smooth. The roar of waterfalls from the surrounding high and immense cliffs of mountain rock was a background of sound so constant that at first it must have seemed itself an aspect of the quietness. As I lay there, inspired to worship, the words from some Psalm came to my mind: "Great peace have they which love thy law."

It came to me—a thought—that the peace of the wilderness is indeed a peace of orderliness, of law. I was not yet aware that the day was Sunday, but the reverie seemed then to turn inward. The words of the Psalm became a text and began to suggest what later seemed almost a sermon.

On a weekend a month earlier I had been in the First Parish Church in Concord, Massachusetts, and now my wandering mind, excited in the Sabbath peace of Lake Solitude, was first going back to that parish church in Concord.

### Ambassador speaks

It was not Sunday but Saturday—not a church congregation but the Thoreau Society—not a preacher but the Ambassador from India. So many had come to this annual meeting of the Society to hear His Excellency discuss "Thoreau and Gandhi" that the parish hall could not hold such numbers. The audience of the hall had become a congregation in the sanctuary.

Now, from the front of this Concord sanctuary His Excellency, the Honorable G. L. Mehta, Ambassador from India to the United States, a month later, was speaking at Lake Solitude in Wyoming's Bighorn Mountains on the importance of conscience.

"To such men as Gandhi and Thoreau," said the Ambassador (as I remembered then but copy now word for word, from the text of the address as printed in the August 13, 1957, issue of the *Congressional Record*), "conscience is the ultimate criterion, the final sanction."

"But," he continued, "in such a concept, conscience is not caprice, not a stray uncoordinated impulse; it is the instructed moral sense, the profounder rationality which is in harmony with the whole personality. It determines right and wrong, it is the reservoir of moral strength, the final safeguard of moral conduct, a fundamental of life which cannot be surrendered. Every individual is regarded, above all, as a moral being, and the most vital contribution man can make to society is the exercise of his moral faculties."

Reflecting then on the Ambassador's emphasis on the importance of conscience in men's conduct, demonstrated by Thoreau and by Gandhi, my mind ran on to the speculation that a glory in the clearness

of such a conscience as the Ambassador was admiring is surely in its loyalty, or its loyalties. Who could know peace by making his own conscience a final sanction if that were to enthrone the arrogance of selfishness? Surely a man's conscience in its "exercise of his moral faculties" for a "vital contribution" to society has within it a keen sense of loyalty; an essential to the great peace of conscience is to love a law of loyalty.

### Meaning of loyalty

My dictionary, I now see, makes loyalty mean enthusiastic or reverent attachment as "to a sovereign or a cause;" faithfulness or truth as "to any person or persons to whom one owes fidelity, especially as a wife to her husband, lovers to each other, friend to friend, a servant to his employer."

Such were my thoughts that Sabbath morning, not thus precise, verbally, but dwelling on wife and family (with whom I had shared a Lake Solitude trip only a year earlier); on The Wilderness Society, my employer; on the cause of conservation and its cooperators, with their rightful expectations of my loyalties; and on friends.

My thoughts ran on then, whimsically, to Shakespeare's great sonnet on friendship, which I had read two days earlier as we all huddled day-long in a continuous downpour of snow-mixed rain in our camp at Lake Geneva on this same excursion—a sonnet that like the words from the Psalm were dwelling in my mind ready for reference without a book in hand:

When to the sessions of sweet  
silent thought  
I summon up remembrance of  
things past,  
I sigh the lack of many a thing I  
sought,  
And with old woes new wail my  
dear times' waste:  
Then can I drown an eye, unus'd  
to flow,  
For precious friends hid in death's  
dateless night  
And weep afresh love's long-since  
cancelled woe,  
And moan the expense of many a  
vanish'd sight.  
Then can I grieve at grievances  
foregone,  
And heavily from woe to woe tell  
o'er.

The sad account of fore-bemoaned moan

Which I new pay as if not paid before.

But if the while I think on thee, dear friend,

All losses are restor'd, and sorrows end.

The richness of friendship, the marvellous resource of still undiscovered friendships repeatedly revealed, the mingling of friendship with cooperation and with the obligations of employment and service to organizations and causes—these reflections on aspects of loyalty and devotion were soon blending with another thought:

#### Tolerance for others

Who would describe as "great peace" a complacency or smugness that would narrow one's loyalty within his own conscience and his own personal associations of family, friends, employments? Surely, it seemed, charitableness and tolerance for all others are also within this law of peace. Then came the inspiring thought of the great community of life on the earth—a thought that merged into recollections of the advocacy of wilderness that has been so great a part of the obligations to organizations and causes that it has been my lot to serve.

I could remember trying to emphasize in addresses and articles our deep need for the humility to know ourselves as the dependent members of a great community of life and suggesting that this can be one of the spiritual benefits of a wilderness experience. Various needs for wilderness, I had seen, are derived from the central need of maintaining an awareness of our human relationships to all life, the need to guard ourselves against a false sense of our own sufficiency.

As these thoughts began stirring, so also did my dozen and one companions, who likewise were awakening into the Sabbath peacefulness of these meadows at the head of Lake Solitude. Crawling out of my sleeping bag I reviewed my "sermon's" first, second, and thirdly—conscience, loyalty, and charitableness—and entered a new week with gratitude that there had been in my mind, that morning, those words from long-past readings—words that I since have located in the 165th verse of the 119th Psalm: "Great peace have they which love thy law." ♪ ♪

#### An Illustrated Guide To Fossil Collecting

By Richard Casanova. Edited by Vinson Brown. San Martin, California. 1957. Naturegraph Company. 80 pages. Illustrated. Paper cover, \$1.50. Cloth bound, \$2.60.

Fossil collecting as an avocation has never produced storms of popular where-to-find-it or how-to-do-it literature, as have some of the burgeoning natural science hobbies like mineral collecting. The amateur fossil collector has had to depend mostly on scientific volumes whose weight sometimes equaled the fossil-bearing rock slabs he uncovered. Richard Casanova has packed much elementary fossil collecting information into a guide that can go easily with the collector into the field, to aid in classifying, preparing and displaying trophies, supplementing it with a valuable locality information guide and a bibliography. P.M.T.

#### In Search of Man

By André Missenard. Translated from the French by Lawrence G. Blochman. New York. 1957. Hawthorn Books. 346 pages. \$5.95.

When Dr. Alexis Carrel published, some twenty years ago, *Man, the Unknown*, the results of the researches that he presented therein gained world-wide attention. The great Nobel prizewinner planned to continue his researches as director of the French Foundation for the Study of Human Problems, but Dr. Carrel's death in 1941 left it to his colleague, André Missenard, to carry on the studies. This book is the result of the extension of this research on the influence of heredity and environment, and the effect of spiritual forces in the formation of man's personality and the society in which he exists. It is impossible, within the limits of a brief notice, to indicate the scope of this deterministic study. We must be content to emphasize its great significance.

#### Halfway up the Sky

By Jane Merchant. Nashville, Tenn. 1957. Abingdon Press. 121 pages. \$2.00.

After reading Miss Merchant's lyrical poems of her Tennessee hills and her Tennessee sky—and the enchantments in between—all sung with a refreshing clarity and in a minor key, we feel that we, too, would have been "greatly fortunate in living there . . . halfway up the sky." R.B.

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### Durable Hide

Had a certain shark, swimming the Carboniferous seas that covered what is now the State of Indiana, known that it was destined to bring joy to the hearts of the Chicago Natural History Museum staff some quarter-billion years later, it might well have welcomed the disaster that snuffed out its life. For this particular shark left not only its fossilized bones, but also its skin—a great rarity—to be found recently by Drs. Rainer Zangerl and Eugene S. Richardson, Jr., of the Museum, during their search of a fossil locality of Parke County, Indiana. As the fossilized remains of other sharks were found closely associated with the prize, Drs. Zangerl and Richardson think that several of the animals were trapped in some way and shared a common fate, to be buried quickly in mud. The 8½ foot specimen is believed to be the first well-preserved fossil shark ever recovered from Coal Age formations.

### Disney Nature Film

Now available for 16mm projectors is the Walt Disney Nature film "Water Birds," presenting rare glimpses into the behavior of seaside and marshland birds, an award-winning film produced in cooperation with the National Audubon Society and the Denver Museum of Natural History. With narration and music this 31-minute Technicolor film is available for daily rental, lease or purchase from Walt Disney Productions, Educational Film Division, Burbank, California.

### Face-Lifting

Secretary of the Interior Fred A. Seaton has announced a Mission 66 program for Yosemite National Park that contemplates, with Congressional approval, the removal of some of the service facilities and employee housing to a new location outside the Arch Rock entrance to the park. Many of the campgrounds that have been so seriously overcrowded in late years are scheduled for renovation and enlargement, and it is hoped that contemplated improvements to park facilities, roads and trails will help relieve the pressure caused by a visitation that now exceeds a million persons a year. "The volume of public use of the valley," says Park Service Director Conrad Wirth, "... is beyond its proper capacity, and we propose to remedy that to such extent as is feasible."

### NOVEMBER'S AUTHORS

Virginia Whitman is the homemaker for "Eden Acres," a farm on the Lake of the Ozarks near Barnumton, Missouri, and is the author of a Sunday column for the Springfield, Missouri, *News-Leader*, and a frequent contributor to newspapers and magazines. . . Hubert Loomis Smith, who jokingly describes himself as a "tropical tramp" by reason of his many years' acquaintance with the tropical forests of Spanish America, is a civil engineer with a particularly soft place in his heart for birds. . . Ulrich Troubetzkoy is the wife of White Russian Prince Serge Troubetzkoy. She is information and research officer for the city government of Richmond, Virginia, coordinator of the Keep Virginia Beautiful, Inc., program with the Richmond Beautification Committee, and a writer of poems and articles for magazines. . . E. John Long, free-lance writer specializing largely in the field of science, is presently assisting in an educational capacity with the marine laboratory of the University of Miami at Coral Gables, Florida. . . Kenneth L. Gosner is a member of the science staff of the Newark, New Jersey, Museum. . . John M. Haller, once instructor of English language and literature at the University of Texas, now makes a career of tree surgery at Austin, Texas; his book and story writing includes "Tree Care," book-of-the-month of the American Garden Guild Book Club last July. . . Alexander F. Skutch is regarded as the best informed living American on the subject of Central American birds, and author of a distinguished book on their life histories, a botanist and ornithologist who makes his home in Costa Rica. . . Robert E. O'Brien, of Des Moines, Iowa, who was picked by *Dame Fortune* to witness one of Nature's least-recorded events, has been president of two Iowa colleges and has served as Secretary of State of Iowa. . . Ralph A. Fisher, Sr., long-time member of The Wilderness Society and a prolific writer of poems, articles and short stories, is a native of New Jersey who now lives at Payson, Arizona. . . Paul Mason Tilden is assistant editor of *Nature Magazine*.

### Bulletin

"The Clearing" is a diary-form account of a week in May at The Clearing at Ellison Bay, Wisconsin, by Virginia S. Eifert, editor of *Living Museum*, publication of the Illinois State Museum, and author of many magazine articles on Nature subjects. The Clearing, built by the late Jens Jensen, noted landscape architect, has been operated since 1951 by the Wisconsin Farm Bureau as an outdoor study haven, with a schedule of classes open to the public. The pleasant story of an observant little group. Twenty-five cents, from the Wisconsin Farm Bureau Federation, Madison 1, Wisconsin.

### Wetland Conservation

The board of directors of the National Wildlife Federation of Washington, D.C., has approved a special fund of \$20,000 for a two-year educational program on the Soil Bank and the importance of conserving water and wetlands wildlife through the curtailment of unwise drainage. "We are . . . gravely concerned about the continued destruction of valuable resources through the unwise drainage of natural marshlands," said executive director Ernest Swift. "We wish to encourage farmers and agricultural agencies as well as conservationists to study the dangers involved in federal subsidies that encourage drainage in areas threatened by water shortages and recurring drought."

### Fossil Ancestor

A cast of a "living fossil" fish, the coelacanth, has been placed on exhibit recently at the Smithsonian Institution's National Museum in Washington, D.C. This first cast of the coelacanth to be shown publicly in this country can be seen in the foyer of the Museum; the fish itself, thought by scientists to have become extinct 70 million years ago, was first caught alive in the Indian Ocean in 1938. Dr. David H. Dunkle, Smithsonian paleontologist, says that "the ancestry of the coelacanth can be traced back 325 million years to the group from which descended all the land vertebrates, of which man is a recent development. This makes it one of the oldest types of backboned animals known." Although discovery of the first coelacanth in 1938 aroused worldwide interest, no more were found until 1952. Since then, 12 have been caught off the Comoro Islands, near the island of Madagascar. The fish on display is a forty-three pound, fifty-one inch male.

### Another Element

The discovery and production of a new synthetic element, number 102, was recently announced by a team of Swedish, British and American scientists. The result of unique international cooperation between nuclear experts of the Argonne National Laboratory at Lemont, Illinois, the British Atomic Research Establishment at Harwell, England, and the Nobel Institute for Physics in Stockholm, Sweden, the new element has been named "nobelium" for the Stockholm institution where the final tests were made.



# Contents noted

BY THE EDITOR

**EDWARD ALEXANDER PREBLE** passed away on October 4 at the age of eighty-six. Consulting naturalist of *Nature Magazine* since 1923, and our associate editor since 1935, he retired from active service only two years ago. A naturalist of the old school, who learned Nature's secrets and wonders first hand in the wild, his life was one of single-minded devotion to wildlife and conservation. Joining the staff of the U. S. Biological Survey in 1892, he specialized in the geographical distribution, life habits and ecology of birds, mammals and plants, and possessed an amazingly catholic knowledge in all of these fields. He was an authority on the animal and plant life of the Athabasca-Mackenzie and Hudson Bay regions as a result of several field trips into northern Canada. He was an able and critical editor, an excellent writer and careful scientist. His imprint on this magazine has been deep and will be enduring. It was a rare privilege to have been intimately associated for many years with "The Commodore", as he was affectionately known to his associates here because of a relationship to the naval figure of the same surname. Besides Mr. Preble's great contributions to knowledge of Nature and to conservation through our pages—a monument in fact—he leaves a 1000-acre sanctuary for wildlife in New Hampshire, where his library is preserved in a beautiful stone building erected in large measure with his own hands. His passing, just as the magazine he loved was going to press, permits only this brief tribute at this time.

**PROTECTION FOR THE TINY KEY DEER** moved close to accomplishment thanks to legislation passed at the recent first session of the 85th Congress. Sparked by Congressmen Charles E. Bennett and Dante B. Fascell of Florida, and by Senator Warren G. Magnuson of Washington, a bill was passed making possible the establishment of a National Key Deer Refuge. The measure was signed into law by the President. Under the law the Secretary of the Interior may acquire "by purchase, donation, the use of donated funds, and exchange for unreserved public lands" not to exceed 1000 acres for administration as a refuge. Land cannot be acquired by condemnation. The number of these deer has increased from a low of 25, a few years ago, to some 125 today, but rapid development of the Florida Keys threatens such a drastic change in environment that the deer are believed to be doomed without some haven. It is hoped that the refuge will quickly become a reality.

## ELECTRONIC DEVICES TO CALL DUCK AND GEESE

wisely have been banned by the Department of the Interior on recommendation of its Fish and Wildlife Service. Such devices imitated bird call and other sounds made by the migrants, and studies indicated their use was diabolically effective. It was found that a typical method was to record sounds of contentment as the ducks and geese were feeding. These sounds were then amplified to attract the birds in flight, or lure birds within range of the amplified call. Penalties for employing such unfair tactics would be a maximum fine of \$500, or a maximum of six months in the pokey, or both. Old-fashioned duck and goose calls are not affected. Congratulations to the Service on the decision against the electronic device.

## HUMANE METHODS OF TRAPPING

animals and birds on all land and waterways under the jurisdiction of the United States would be required under an amendment to the United States Code through S.2489, introduced by Senator Neuberger of Oregon, in collaboration with Senators Humphrey of Minnesota and Kefauver of Tennessee. This bill, which is now in the hands of the Senate Committee on Interior and Insular Affairs, would prohibit the use of any device by which "the animal or bird is not either captured painlessly or killed instantly." Also it would require inspection and emptying of any trapline once in every twenty-four hours. The Secretary of the Interior would be authorized to conduct tests and promulgate standards, rules and regulations necessary to carrying out this provision. We hope that this bill will get early hearing at the next session of the 85th Congress and enjoy early and favorable action. We would suggest one slight amendment in the interests of accuracy—substitution of the word "mammal" for "animal." In introducing the bill, Senator Neuberger declared: "The primitive, cruel trapping practices of the last century are an anachronism today."

## HAWK MOUNTAIN SANCTUARY ASSOCIATION'S

annual report is always a source of satisfaction since it emphasizes the progress of recent years in development of an informed attitude toward our so-called predatory birds. Not that we do not have a long way to go in many areas, but the recent enactment of laws protecting all hawks in several States, and in Ontario Province, is a reflection of the educational process that has been taking place. To this the Hawk Mountain Sanctuary in Pennsylvania has certainly made contribution. Through this reservation not only adults but a great many young people have been introduced to the beauty of the hawk on the wing and to the facts about the place of these birds in the wild community. If you do not know of this Sanctuary a note to Hawk Mountain Sanctuary, Route 2, Kempton, Pennsylvania, will bring you enlightenment.

R.W.W.



"The scalloped break of whitecaps on a wave-washed beach. . ."

## Gratitude

By VIRGINIA WHITMAN

*Photograph by Ray Atkeson*

*It is the month of Thanksgiving, and in our wonderful outdoors I am thankful*

FOR TEXTURE—the serried bristles on a wild turkey's head; the flannel fuzziness of a mullein leaf, the pebbled curve of a hedge apple; the slick smoothness of a peeled willow wand; the fine furriness of a pussy willow catkin . . .

FOR FORM—The cellular uniformity of a wasp's nursery; the geometrical precision of a spider's web; the decorative spiral of a snail's shell; the radiating symmetry of a mushroom's gills; the circular perfection of a button-bush ball . . .

FOR MOTION—the scalloped break of whitecaps on a wave-washed beach; the arched swoop of a belted kingfisher; the trembling nod of breeze-blown leaves; the open and close of a tiptling butterfly's wings; the nervous fanning of a foxsquirrel's tail; the graceful leap of a fleeing deer . . .

FOR SOUND—the pre-dawn medley of the music-making mockingbird; the mischievous scamper of inquisitive chipmunks; the rattle and roll of falling acorns; the intermittent staccato of hammering woodpeckers; the liquid melody of the red-winged blackbird; the drowsy monotony of a nocturnal insect's hum; the sleepy twittering of birds disturbed at night; the soft patter of prayed-for raindrops . . .

FOR FRAGRANCE—of dew-damp grasses and fog-freshened

forests; of a wild plum thicket in frosty bloom; of parasol-protected may-apple blossoms; of wild grape spice wafted on summer winds; of bruised cedar and brookside mint crushed by careless heels . . .

FOR COLOR—the yellow of a rising sun's reflection spilled across a lake; of spring dandelions and buttercups, of a busy bumblebee's velvet back; of hickory and sycamore leaves when the year is three-quarters gone . . . the orange on a box turtle's shell; of a butterfly-weed's bloom in summer; of jack o'lantern fungus or sassafras leaves in autumn . . . the red of sumac and witch-hazel leaves; of half-ripe wild cherries; of a cock cardinal; of Christmasy dogwood berries . . . the blue of chicory, larkspur, and lobelia blossoms; of an October sky; of the happiness bird . . . the purple of April violets; of ripening grapes; of a sunset deepening into dusk . . . the green of lichen and moss and cedar; of a luna moth's wings; a mallard duck's head; a frog's back . . . the indescribable tints and shades of shells and stones and clouds; the black and white of light and shadow cast by midday sun or midnight moon; the gold and silver of water and sky and planet . . .

FOR GOD, the Creator of it all. "O Lord, how manifold are thy works! In wisdom hast thou made them all: the earth is full of thy riches." (*Psalms* 104:24) ☸☸☸



# Snooky

*The story of  
a foundling oriole*

By

HUBERT LOOMIS SMITH

*Illustrations by Clarence Tillenius*

"Snooky had changed his modest olive for the glistening gold and ebony of the adult male."

**S**NOOKY CAME into our lives through tragedy. Walking down a street one morning, I found him, half-fledged and gasping in the gutter. Forty feet overhead, from the fringed leaf-tip of a California fan palm, hung a few forlorn wisps of what had been the pendent cradle of the Arizona hooded oriole. Many stones, brickbats and sticks scattered over the sidewalk and pavement told the sordid story of juvenile cruelty.

I could not return him to a nest that no longer existed, he was too young and too sorely hurt to cling to a bare limb. Nor could I bring myself to obey the law, and leave him to a roaming cat. So I became a lawbreaker and took him home. I firmly believe in our wildlife protective regulations. But I believe, too, that where man-made laws chance to be in total conflict with the eternal law of mercy, the latter must dominate.

My foundling was too far gone to open his mouth, but I forced his beak open with my finger nails and gave him a little water from a dropper, following it up with a few drops of boiled milk in which a little white of raw egg had been stirred. We continued to force this mixture into him at frequent intervals through the day, and we wrapped him well in warm flannel at night, cuddling him in a box with a low-watt electric bulb so placed as not to risk scorching.

It was several days before our waif showed much improvement. But finally he became quite normal and

ravenous for four or five days, then suddenly relapsed and we lost all hope of saving him. Too weak even to draw his feet under him, he lay on his side with lolling neck and legs limply extended. Yet I persisted in the forced feeding, and in about a week he was well again.

Never was a recovery more miraculous or more thorough; from that time on, Snooky was the healthiest of birds. He happened to be our only pet at the time, and having been snatched from death with such labor, he was humored and fondled like a first baby. Indeed, we scarcely thought of him as a bird, but treated him as a member of the family.

Perhaps it was Snooky's upbringing that made him so different from all other birds I have known. More likely, he was temperamentally different by nature. Every aviculturist knows that there is a marked difference in disposition and intelligence between individuals of the same species, and it seems logical that at rare intervals a veritable bird genius should be hatched. Snooky was such a one; and his was the genius of happiness. It was as though he had sensed that his life would be brief, and had determined to fill every fleeting moment of it with gaiety.

For a large part of every day the bird had the freedom of the house, which, in practice, meant freedom of the room in which some member of the family happened to be—for he would never voluntarily lose sight of his

human friends for a single moment. If forced to do so, his bubbling spirits were visibly dampened, although not wholly subdued.

Snooky's curiosity was insatiable. Every article in the room was examined with the intent gaze of a watchmaker, every crack probed, and every small movable object shifted, or overturned by a thrust of the bill, while each mischievous idea that entered his sleek head was welcomed with the gleeful *ee-ee-ee-ee* of the oriole. A book fascinated him, and his efforts to separate the pages often stayed his devastating course for many minutes. This probing was without doubt the insect-hunting instinct in action, but I am sure that food was far from Snooky's thoughts while he was so engaged.

Most tame birds are shy with strangers, if not actually afraid of them, but Snooky was hampered by no inhibitions or inferiority complex. No visitor had time to sit down before Snooky was engaged in an earnest exploration and probing of the hair, eyebrows, ears and the intriguing crevasse between collar and neck. His opinion of what he found must have been unflattering, for he paused frequently with his bill half-opened in a ludicrous silent laugh, or chuckled his *ee-ee-ee* in undisguised mirth.

Snooky had a tiny blue butter-plate in which special food-treats were usually given him. He always recognized this as his own, and seemed to have an affection for it. His appetite was enormous and as versatile as a crow's. There was almost nothing that he would not eat. Toughened by adversity in his infancy, his health seemed indestructible.

The young oriole was fond of peaches, and the process of peeling them for preserving held so much of gustatory and technical interest that his services as aide-de-cook were offered freely, and with persistence. The table where bacon was being sliced in the morning also was replete with entertainment and material reward. He loved to stuff himself with thin slivers of the raw bacon fat, and never failed to show up at the proper moment.

But the food of foods, in Snooky's opinion, was boiled cabbage. He always seemed to know when cabbage was

being cooked, and he waited eagerly for his little blue butter-plate to be filled. Boiled cabbage days were red-letter days to Snooky. Hotcake batter and biscuit dough were not particularly enjoyed, but a few sips or nips were always taken, perhaps out of courtesy to the cook.

In fact, Snooky partook regularly, if sparingly, of many things for which he had no craving at all. Ink, for instance. As a beverage, he detested ink; yet his philosophy seemed to dic-



"I found him half-fledged and gasping in the gutter."

tate that everything should be tried at least once a day. So, every afternoon when the ink pot was opened, he reached gingerly in, tossed off a small snifter, sputtered, and wiped his bill in violent distaste. Yet, on the following day, he would be ready for another "wee drap." Not because of a defective memory, to be sure, for daily he sidled up to the dreaded black bottle, and to me his expression and actions told more plainly than words that he was steeling himself for an act of heroism. Evidently he considered it the sporting thing to do.

But if Snooky's taste for ink as a beverage lacked sincerity, his love of it in other forms was certainly genuine. He delighted in tracking wet ink across the white blotter covering my desk, and would inspect the resulting Hebraic script with a comical expression of amusement. The oriole is the only bird I know that actually smiles, and Snooky, with his mouth half-opened in a silent laugh and his beady, black eyes twinkling, was often the very picture of roguish glee.

The act of writing greatly mystified the bird. Edging close, he would lean forward, watching the pen move over the paper, apparently puzzled by the sudden appearance of wormy, black lines where none had been before. If permitted, he would apply the tip of his bill to a line and, pushing it ahead of him like a plough, would solemnly march in a tipsy course across the paper, as he retraced the convolutions of the inked words.

Snooky also was interested in the printed word, and would scan the columns of a newspaper with, I thought, considerable gravity. The illustrations in a book or magazine aroused vast enthusiasm. When the pages were rapidly turned he would perch on my wrist and watch eagerly for a picture to appear. When it did, he would open his mouth with excitement, and hold up one foot in a detaining gesture that obviously meant "Hold it!" and was one of his most endearing mannerisms.

On my desk was a little red-and-white celluloid ball that Snooky prized as a personal belonging. Chuckling to himself with many an *ee-ee-ee*, he would roll it back and forth until it fell off the edge of the desk—a result that always evoked a great show of mock surprise,



"From that time on Snooky was the healthiest bird that ever drew breath."



although the twinkle in his eye and the gleeful opening of his mouth showed that this was according to plan. It was his little joke, and almost daily he played it with undiminishing relish.

But the pinnacle of Snooky's day was the dinner hour, and it was then that his quaint little personality seemed most human. For a long time Snooky was barred from the family board, as we conjured up visions of overturned cream pitcher, spilled coffee, drilled butter, scattered meat and vegetables, and tracks outlined in gravy across the table cloth.

Nothing could have been farther from the truth. Certainly his table manners were a trifle crude the first few times he invited himself to the meal, but it took only a few thumps of the finger to discourage such lapses, and in a short time his deportment was that of an avian Lord Chesterfield. We fell into the habit of letting him into the dining room for every midday meal. Always he took his place at the table by his own little blue butter-plate, just to the right of my own plate, and never would he stir from this position as long as the meal was in progress.

Once he had learned his manners, Snooky never reached into my plate, no matter how tempting the food, but would intently follow the upward course of each forkful, with tilted head and shining eyes. If anything looked particularly good, he would raise one foot high with extended toes in a sudden detaining gesture, for all the world like a policeman halting traffic, and the drollest thing imaginable. This was a sign that he wished that morsel to be deposited in his little blue butterplate, where he could sample it—but, to tell the truth, he did usually take a nip from the fork before the transfer was completed. Usually, he had a tiny bowl of milk from which at intervals he sipped politely; but he was not at all finical, and did not mind drinking from *my* glass if it was near him.

In spite of his activity, Snooky was fond of his cage. He voluntarily spent much time in it, especially during the drowsy heart of the afternoon, which was passed in a musical reverie as he learned to warble the note-tumbled, lilting song of his species. But he was not contented in his cage—or out of it—unless one of the family was in sight; so we formed the habit of riding him on a finger from room to room as the social center of gravity shifted. He was the most obedient of birds, and would invariably mount a finger when it was extended to him. If Snooky wished to be liberated from his cage, he would attract attention with a sharp, insistent little *caw!*, accompanied by the detaining gesture of the foot. For that, and his roguish, half-opened mouth, I always shall remember him best.

Unlike most hand-reared birds, Snooky never voluntarily went to roost in his cage at night. He retired at about nine, and, if loose, would invariably crawl under my coat, worming his way into a warm nook under my armpit. And always he was very petulant when dragged from his snug sleeping place, struggling and biting my fingers. At all other times he was singularly sweet-tempered and tractable, never showing resentment when we spoiled his "best laid plans" by shutting him in his cage, or in any way displaying the wilfulness one learns to expect in very tame birds.

In strange contrast to a complete lack of fear of anyone, or of anything that might happen within the house, Snooky was mortally afraid of the outdoor world. He loved to perch on the shoulder of anyone moving from room to room. I attributed this partly to his fondness for riding, and partly because of the new fields for scientific research such journeys opened up to him. Yet if the one on whom he rode passed close by a window—even a closed window—he would run around to the far shoulder and cower down, or else fly away, to resume his ride only when the opening to the terrifying outer world had been safely left behind.

Late in the winter Snooky changed his modest olive

for the glistening gold and ebony of the adult male, and the jostling ecstatic notes of his song grew louder and mellower. As the days grew warmer, we turned him loose during the day in a spacious screened veranda, open to the sun and air of the desert; a veranda oasis lush with a great variety of plants in pots and urns.

Pleasant as this was, Snooky hated his daily expulsion, and although he lost his terror of the outer world, he never missed an opportunity to slip

back into the house. While this was easy at first, the prank grew more difficult as I grew more wary, and circumventing me came to be a game with him. Watching sharply from a distance as I approached the door, he would pretend to be interested in other matters. Then, as I stepped through the doorway, he would dart through with me like an arrow from a bow.

On the porch, his time was spent largely in frolicking with a small lizard that ran about on the outside of the screening, while Snooky scampered neck and neck with him on the inside, his sharp little claws interlocking with those of the peeved reptile, his staccato *oo-oo-oo* ringing close in its unwilling ear.



With strangers, Snooky was not hampered by inhibitions or a inferiority complex.

We planned, when summer came, to give Snooky full freedom of choice regarding his future, and talked of cutting, high on the screen, a Lilliputian doorway into the garden always to be open for his exits and entries. And there would be another private entrance from the veranda into the house, so he could visit his cherished folks at will.

Yet, deep in our hearts, something told us that our little spirit of gladness was too perfect for permanence, and would flit away before long. And so it was—for as he came into our lives, unexpectedly and through tragedy, so he went out.

It was early spring, and the day predestined for the curtain-fall in the merry little drama of Snooky had arrived. No warning cloud shadowed his morning, or ours. I had been working in the garden by his porch, and he had been in unusually exuberant spirits, fluttering against the screen in mock attack as I moved about just outside the wire, *ee-ee-ee-ing* and cawing to attract my attention. I suppose his nose or his sharp little eyes had told him, too, that this was to be a red-letter day, a day of boiled cabbage; and when just before dinner an errand took me out on his porch, I could see that he was twinkling with anticipation, and more than usually impatient to get into the house. He was at the far end of the long

Snooky spent considerable time on the porch frolicking with a small and unwilling lizard.



veranda, pretending as usual that he was not interested in doors; but the roguish light in his eye told me that he planned to play the daily game. Still, the distance from little Snooky to the door was so great that no accident seemed possible.

I opened the door and quickly closed it behind me. There was a little scream, the soft, sickening thud of wood and tender flesh and tiny bones. My heart stood still! In consternation I swung about in time to see the door rebound slightly and release a little bundle of feathers—gold and ebony. I expected Snooky to fall dead, but his small body had been caught well behind the most vital organs, and he was denied the mercy of instant death.

Instead, the stricken birdling flew to me; to his pal, his life-long refuge—and clung to my sleeve. I took him in my hand, and he fixed his eyes on mine; those elfin eyes, so roguish a moment before, now filled with unfathomed anguish. Falteringly, beseechingly, he raised one little foot in the old, endearing gesture. That pitiful, imploring, little foot! For years it has haunted me. Snooky was only eight months old. Just a tiny tyke in deep trouble, and he wanted his pal to hold him close.

Gently I closed my fingers about the wee, frail body, and he nestled in my palm. All pain seemed to leave him now, but I knew that hope was vain. For a few seconds his bright eyes gazed up at me in numb wonder. Then, without sign of suffering or death-struggle, he grew limp, with not a single gay feather in disarray.

Tenderly I laid the little prankster on the desk pad by the little red-and-white ball, on the desk pad with small Hebraic ink-tracks criss-crossing it. I wanted no dinner, and I left the house from which the spirit of gladness had taken flight. As I passed the dining table I saw a little, blue butter-plate with a bit of boiled cabbage placed in it to cool.

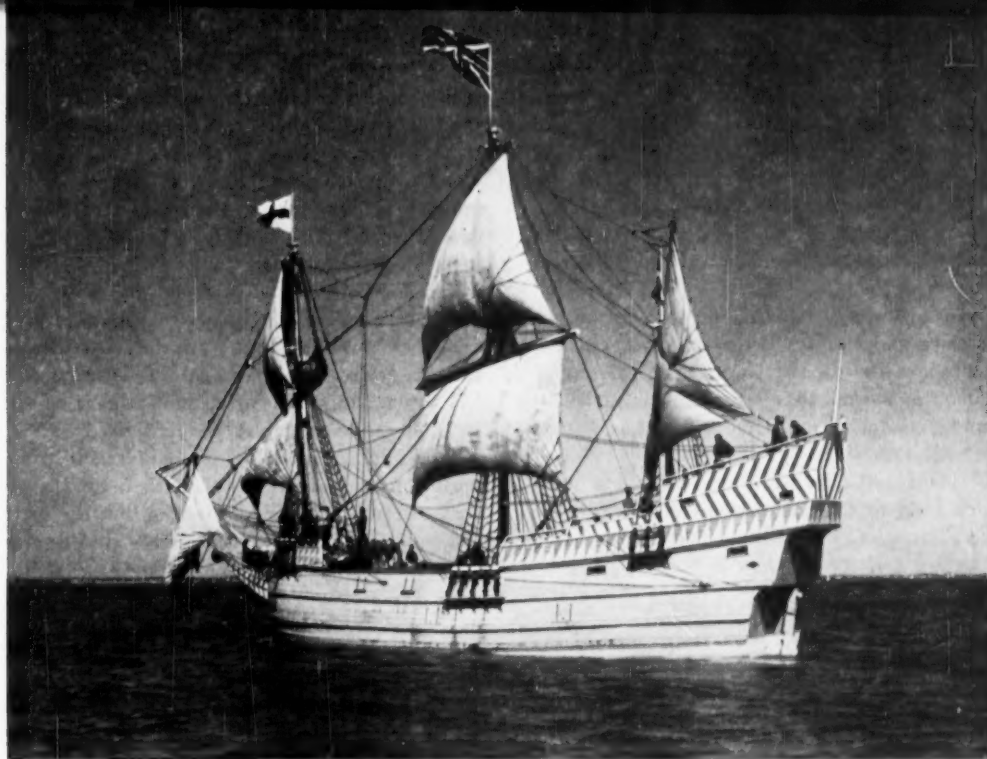


## FOR A BLUEJAY

*Oh, I am charged with beauty  
By the blue fire of a wing;  
More than I can bear, almost,  
And be contained;  
While for rape and roguery  
You stand condemned —  
Moral precept measuring amoral deed —  
Your place beneath the sun  
Held in abeyance!  
Let this travesty, I say, be done,  
Or carried forthwith  
To the Highest Court!*

*Fragment of sky in meteoric flight  
When autumn reds, varying gold, and bronze  
Weave tapestries to complement  
Your royal shade,  
Nothing is wanting —  
No apology is made.*

Mae Norton Morris



This is a replica of the 100-ton flagship "Susan Constant," one of three ships that brought the first permanent English settlers to the New World in 1607.

## Virginia Wilderness—1607

By ULRICH TROUBETZKOY

**W**HAT WAS the wilderness like when the first English adventurers came to Virginia in 1607? What kind of soil did it have? What trees grew in its forests, and what plants in its fields? What creatures lived in its woods and waters and soared against its sky?

The greenness of Virginia must have looked good to men who had spent cramped, tedious months at sea in their three little ships, and even as they sailed between the capes they could smell the pines across the glittering water.

Coming from a nation of shipbuilders and seafarers, they looked appraisingly at the lofty trees along the banks of the Virginia rivers—already seeing the straightest and tallest as masts and spars for English rigging. Pines, the first trees seen in Virginia, were numerous on the coast and at the mouths of the larger streams, but otherwise quite scattered. On the southern side of modern Hampton Roads, Captain John Smith saw "the shores overgrown with the greatest pyne and firre trees we ever saw in the Country." The ship *Star*, sent to transport masts in 1612, was unable to store even forty of the eighty trunks until they were shortened with an ax. However, a letter of the Governor and

Council in Virginia to the Company in London, in 1622, made the statement that the pines were so dispersed that pitch and tar could never become staple commodities of the Colony. The pine is largely a second growth tree in tidewater.

So tall and erect were the oaks that, according to Smith, their trunks could be made into timbers twenty yards long and two and a half feet square. The early settlers called hickories "walnuts," but, even allowing for that, true walnuts were extremely plentiful, and the black variety came to be valued highly in the construction of furniture.

The cedars of Virginia were compared favorably to those of Lebanon. The settlers claimed to have measured cypresses three fathoms in girth at the roots, and sixty to eighty feet high. There were beautiful groves of mulberry in some parts of tidewater. The ash was common, and the colonists soon got busy converting it into soap ashes for shipment to England. Sassafras was common, then as now, and so plentiful on Jamestown Island that the colonists neglected their cornfields to secure it in the early years of the settlement. Flowering locusts and tulip poplars were noted by Beverley.

Chestnuts were numerous near the falls of the James River, where Richmond is now located, and the size and flavor of the nuts were compared favorably to those of Spain, Germany, and Italy by early colonists who had visited those countries. The chinquapin grew in the thin soil of the ridges. There were hazelnuts in swamps, and were also to be found on the highlands at the heads of rivers.

The only native apple tree was the crab apple, but there were three varieties of cherries, and two kinds of plums resembling English damsons. Smith described the persimmon as a fruit that puckered the mouth, if eaten when not entirely ripe. Later colonists used it for brewing beer.

Only the black raspberry grew in Virginia in 1607, but Beverley claimed the colonists preferred it to the English red variety. Cranberries grew in the bogs, and



PHOTOGRAPH BY L. G. KESTELOO

The dunes of Cape Henry reminded Captain John Smith of England, while on the southern side of what is now Hampton Roads, he noticed "the greatest pyne and fire trees wee ever saw in the Country."

whortleberries in the valleys. Smith remarked on the gooseberries; but, oddly, there is no reference in early records to blackberries, although they almost certainly were common then as now. Although the two fruits would not be mistaken for each other in actuality, perhaps in verbal description they were confused with the black raspberries.

It was the abundance of wild grapes and the hugeness of the vines that most impressed the colonists. It was noted that only the vines near Indian villages, and along streams and swamps, bore much fruit, because they were reached by the sun in these open places. There were four varieties of grapes—the large fox grape, two small late kinds and a vine that clung to the ground and bore

small bunches of fruit that varied somewhat in color.

Ralph Hamor called the Virginia strawberries "much fairer and more sweete than ours." Beverley reported in a later period that they were "so plentiful that very few persons take care to transplant them, but can find enough to fill their baskets, when they have a mind, in the deserted old fields."

The Jamestown settlers found the myrtle bush—or bay—as abundant as visitors to tidewater still find it around the marshes. Later on, the settlers learned how to make a transparent greenish wax that did not melt in hot weather, and candles made of it gave off a pleasant pungent perfume when they were snuffed.

Wild hops in fertile low ground, acres of wild onions, muskmelons, squashes, may apples, beans and pumpkins were already growing in Virginia, but the watermelon and potato, so closely associated with Virginia today, came later from Europe and the West Indies. The tobacco and maize the Englishmen saw growing in Indian gardens were to exercise a controlling influence on the fortunes of the Colony. It was Jefferson who first called attention to the fact that the first colonists failed to record whether tobacco was indigenous to Virginia, or whether tillage was always necessary to its production. He surmised that it was of tropical origin, transmitted from tribe to tribe until it reached Virginia.

The Indian grain called *mattoun* bore a resemblance to rye, and was perhaps the wild oats still so common along tidewater rivers. The settlers found they could make cordage and linen from the water flags. Sumac leaves, puccoon and snake-root were used for dyeing and medicinal purposes. Jamestown—or Jimson—weed gave rise to many tall tales of its sinister powers. There were numerous varieties of sorrel and parsley in the woods, extensive fields of wild flax. Some settlers acquired a taste for tuckahoe, a term that apparently included the roots of both the water-loving arrow arum and the related golden-club. The Indians ate tuckahoe roasted and sliced, or mixed with meal and sorrel.

Fresh, clean water was what delighted the seafarers most after their months on shipboard. Percy described their delight at the clear streams they found when they landed at Cape Henry. In the seventeenth century, all vessels leaving the James on their outward voyages took a supply of water from a spring at Newport News. "All ships came here to take in water on their way Home," wrote Devries in 1633. It was claimed that Virginia spring water required more malt in producing beer, and that soap did not lather as freely as in English water. Captain Smith described the bland sweetness of a spring from which they drank at Arrahattock, during the voyage of exploration in 1607 to the present site of Richmond, at the falls of the James. Even in 1957 there are still nine approved springs within the city limits of Richmond.

Captain Smith also observed the soil of the new



country in 1607. The narrow point of land at Cape Henry reminded him of the drifted sands of English dunes. He observed the great fertility of the valley of the Powhatan (now the James) and noticed deposits of fuller's earth, and evidence of iron. The first iron works in America was later set up at Falling Creek, not far below present Richmond. In general, he described the soil as sandy black loam, interspersed with thick clay and beds of barren earth and stone. On a visit to the Eastern Shore, he observed that the territory of Accomac was composed of fertile clay. Only pyrites buoyed the first settlers' hopes of finding gold. Later on, some silver and gold deposits were discovered, but never in the abundance of which the colonists had dreamed.

The marshes of Virginia have served through the centuries to protect tidewater wildlife. The whitetail deer was the principal animal in aboriginal as in present-day Virginia. The deer survived the ruthless hunting of the Indians, who ringed their game with fire and slaughtered bucks, does and fawns alike. Yet today there are probably more deer in the peninsula swamps than in any other part of the State, despite the cities, towns and military installations, and the intensive hunting.

There are indications that the buffalo—now extinct throughout Virginia—at one time ranged east of the mountains. There were elk, too, which became extinct, but have since been restored in some counties. There were small but ravenous wolves, and early in the next century, Clayton said they sounded like a pack of beagles hunting in the night. They, too, are gone.

Virginia bears encountered by the adventurers were small but numerous in what is now Princess Anne County. Gradually, they retreated into the Dismal Swamp, and many still inhabit it today. The Indians had a particular fondness for bear meat. Tail of beaver also was considered a great delicacy, but should not have been hard to come by, since beavers lived in all the streams suitable for erecting dams.

Raccoons and opossums were described as monkeys in letters to England. Clayton, in 1739, described porcupines as already rare, but there were many otters, wildcats, skunks and marten. The Jamestown settlers found both red and gray foxes and gray, ground and flying squirrels. Of course, it was the latter which stole the show, and were much sought by English nobleman for their parks, and by naturalists for their collections. King James particularly wanted one of these delightful pets.

Cottontail rabbits and bobwhite quail were apparently far less numerous than they are now, since the wilderness did not favor their spread as do the open fields of today. There were more rabbits on the open land near the falls—now Richmond—than in the forest land around Jamestown.

Naturally, the Virginia mosquitoes and chiggers attracted unhappy attention. Bullfrogs and tree frogs

were described by the colonists, who had as much trouble locating the peepers as do their descendants. There are no records of rattlesnakes being seen by the 1607 settlers, although Clayton saw them toward the end of the century. Other harmless snakes were common, and during the starving time the colonists were not squeamish about eating them, as well as dogs, rats and mice and "all the quick things there weare there." Turtles were found in the bay and rivers, and land tortoises were daily fare.

People in Virginia have never stopped talking about the wilderness days when the rivers were teeming with fish, and when they were so thick in the bay that lazy settlers scooped them directly into their frying pans. Shad were often a yard long. The sturgeon, herring and rockfishes were countless. In one seining, Sir Thomas Dale netted five thousand pounds of sturgeon. Thomas Rolfe, in



PHOTOGRAPH BY L. G. KESTELOO

The settlers of 1607 learned Indian methods of preparing fish, oysters, clams and turtles, as demonstrated by this Pamunkey Indian girl at the Festival celebrating the 350th anniversary of Jamestown.

his *Relation*, says: "I tooke once 52 Sturgeons at a draught, at another 68," and Captain Smith reported that in a few hours two men killed forty sturgeon with axes in the river near Jamestown. Drum six feet long were reported. More than two dozen different kinds of fishes were mentioned by the colonists. Even allowing for the elastic in fish stories, Virginia waters really were teeming. To add to the excitement, Smith was severely bitten by a sting ray during his voyage in the Chesapeake.

William Strachey wrote about oysters 13 inches long, probably including the shell. Oyster banks rose above the surface at ebb tide in some of the rivers like rocks in the bed of a stream. In 1609, one group of starving colonists survived nine weeks on oysters and one pint of



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The cardinal or "carnation bird" was much admired by the early Virginia settlers. This cardinal on a hickory limb is thought to be the first published portrait of the cardinal, State bird of Virginia.



VIRGINIA STATE LIBRARY

Flowering dogwood lightened the early Virginia woods, and made a subject for a color plate in F. Andrew Michaux's *The North American Sylva*, published in Philadelphia in 1817.

Indian corn a week. Mussels were especially abundant at Weyanoke. They found two kinds of crabs, one reportedly large enough to make a meal for four men.

In retrospect, reports of wild fowl sound even more fabulous than those of fish, especially as they were drawn in the fall to the heavy growth of wild plants. The colonists noted swans, wild geese, many varieties of ducks, plover, snipe, woodcock and curlew. Although there is no specific reference to rails and sora, they were almost surely even more plentiful in the gold-brown autumn marshes than they are today.

The first birds described by a settler were the "black birds with crimson wings," seen by George Percy, and the wild turkeys that still survive in most parts of Virginia, but in much diminished numbers. Weights of forty to seventy pounds for turkeys sounds much exaggerated, and certainly is many times the average weight of the wild birds today.

Strachey wrote of the flights of wild pigeons as resembling "thickned clowdes," and Hamor asserted that it took three or four hours for the flocks to pass a single point. Strachey and other early writers spoke of the parakeet as a common bird in Virginia, as well as North Carolina, but it has been long extinct. The last passenger pigeon died in 1914 in the Cincinnati Zoo.

The mockingbird was an object of wonder and admiration. So was the cardinal, which the settlers called

"carnation bird" and "Virginia nightingale." They often were caged and sent to England, where they languished. John Clayton observed, "With much difficulty are any of them brought to live in England."

Eagles, fish-hawks, two larks, martins, several herons, bitterns, screech owls, several goldfinches, jays and crows were described by the men of Jamestown. Strachey compiled a bird list with notes in 1610-1612, but the English naturalist Mark Catesby (1682-1749) wrote the earliest first-hand scientific account of birds in Virginia in 1731.

Freedom from undergrowth was one of the notable features of the original woods of Virginia. There were so few thickets that, according to Captain Smith, the colonists could arrange a perfect order of battle among the trees. Later on, it was said to be difficult to keep greyhounds in Virginia, because in their headlong speed they dashed their brains out against the great trees.

There are few specific references in the early narratives to the wild flowers of Virginia, although Percy compared the fields around Jamestown to an English garden. The familiar rose and violet (for "brothes and sallets") are among the few mentioned, although the honeysuckle must have been here, and the flowering dogwood surely lightened the primeval woods. It was much later, in 1705, when John Clayton came to Virginia and gathered the materials for his *Flora Vir-* (continued on page 500)

Looking up the peaceful Potomac River from the west end of Plummers Island, it is hard to believe that the noise and confusion of a great city are only nine miles distant.



*A haven for the biologist is*

## Plummers Island

By E. JOHN LONG

*Photographs by the Author*

**M**AYBE THERE is another patch of this old Earth of ours whose flora and fauna have been more thoroughly researched than those of Plummers Island, but the members of the Washington Biologists' Field Club are not aware of it.

If you, in turn, are not aware of Plummers Island, that is according to plan. For more than half a century these few precious acres of primeval wilderness, just nine miles up the Potomac Valley from the White House, have been the jealously guarded retreat and field study area of some of the top scientists of the National Capital area.

Its members have eschewed publicity, aside from technical papers describing scientific discoveries made there, because they feared it might attract mere curiosity seekers, or, worse still, those who would gather "samples" from the island's rich treasure chest of plants, flowers, ferns, insects, and mosses. But I, although a non-member, was permitted to visit and to photograph Plummers Island several times, and was invited to attend the spring shad bake, one of the few social events of the Washington Biologists' Field Club.

Considered as a whole, there is no word for the Plummers Island reservation except *unique*. It does not resemble any of the other rocky islands of the Potomac River gorge, nor any area of its size elsewhere that I can recall. Some of its members consider it as an almost ideal natural science "laboratory," others cherish it as a Shangri-La where they may catch up with their thoughts. Still others value it as a forum where "the other fellow really speaks my language."

To me, Plummers Island and the adjacent shorelines on both sides of the Potomac comprise a little of all these virtues, amid the most beautiful and unspoiled natural



The only access to Plummers Island is by a row-boat ferry that operates on an endless rope-pulley arrangement.

setting to be found within the entire Washington area.

After tramping up and down the island's rocky trails and peering into fern-carpeted dens and shaded bowers, where plant and animal, bird and insect life go on through the seasons, as it must have done long before the white man came to America, it is hard to conceive that any change in status of the island can be for the better.



The main entrance to the reservation is by a gate near Lock 11 of the old Chesapeake & Ohio Canal. Every member of the Club is provided with a key for the gate.

Except for narrow footpaths, and a rustic cabin on a tree-crowned knoll sixty feet above the palisaded gorge of the Potomac, the island really shows little evidence of man's intrusion, although, as I mentioned earlier, it undoubtedly is the most thoroughly picked-over piece of real estate of its size in the world.

Once in a while a dead tree is cut down to provide firewood, or honeysuckle is cleared from a pathway. But otherwise Nature still has its way, unhampered in its inexorable laws, its checks and balances. Moulds, funguses, and insect-blights run their normal courses, and the members watch these as enthusiastically as the rest of us might observe what we considered more pleasing forms of life.

Some years ago, a number of plants and trees were introduced to the island and to the adjacent mainland area also owned by the Club, but no such transplanting has been done in recent years, the members concentrating their efforts on a thorough biological survey of native flora and fauna.

If you do not believe that a twelve-acre island and thirty-eight and one-half acres of mainland property can possibly offer much elbow-room for research, here is the box score of accredited different species or types reported by Club members since 1901: mammals 26; birds 186; reptiles 22; amphibians (like frogs and turtles) 20; fishes 54; beetles 1500; flies, more than 500; other insects 480; flowering plants 776, of which 103 are trees, shrubs or woody vines; ferns and scouring rushes 18; mosses 70; lichens 80; and funguses 118. Some work has been done on other living things, but

the results of this work has not yet been summarized.

This is an amazing list for so restricted an area, and explains why Plummers Island, among systematic biologists at least, has become one of the world's most famous collecting spots and type localities. Geographical location, about midway between the north and the south, accounts partly for the rich variety of its insect, bird and plant life. Here, too, the piedmont drops off to the coastal plain. In summer the backwater between the island and the mainland is bordered by lush, jungle-like growth, while up on the dry rocky headlands, overhanging the river, "prickly pear" cactus thrives.

Almost every square foot of the island has been studied at one time or another by Club members or visitors, and most of it several times each year. Despite such expert attention, an occasional new type-specimen is discovered and named, and each year a number of species, not new to science but hitherto unnoticed on the island, are added to the official lists.

As a result of the weekend foragings of its members,



One of the three annual gatherings of the membership of the Club is the spring shad bake, where the cooking is done by the members themselves.

the Club has been able to extend the range of certain plants, insects and birds. Several species heretofore known only from such areas as Texas and Mexico, and in one or two instances even from Europe, have been collected on the property. Such discoveries show both the need for more intensive local studies and the great reward in the way of new knowledge awaiting natural history enthusiasts.

Strict rules govern all spade and ax work on the island. When a new bit of Nature is discovered, the scientist identifies it, puts a notation in the card catalog, and marks the spot on a map of the island kept in the cabin.

While the reservation is available to the Club's active members throughout the year, the number of guests is limited, and there is a ban on dogs, portable radios, phonographs and television sets. "We can get enough



of them at home," one of the members explains. "It's very nice to have silence for a change."

Who was Plummer, and how did the island get its name? No one knows, although Club members made a diligent search of early land records. Until the Club expressed an interest in the place, no one had bothered to look into the island's history at all. The original grant of territory adjacent to the island was made as early as 1684, the estate being called Carderrock. In neither this nor any later deed was an island mentioned, the southern boundary of the tract being the shore of the river.

In other words, at the turn of the century Plummers, as an island, simply did not exist! Yet there is geological evidence that the island has been separated from the mainland since time immemorial. The previous owner's title to the island obviously was shaky, to say the least. So the Club decided to acquire the island by patent, just as it might have back in the days of Lord Baltimore.

This step was taken in 1907, and a brand-new patent was issued, after obtaining a quit-claim from the is-



Club President Lloyd W. Swift talks as members eat shad with all the trimmings. At this fish dinner, distinguished scientists may find themselves cooks, waiters, or dishwashers.

land's previous claimant. Additional purchases of land on the mainland finally gave the Club a protective tract that overlaps the island at both ends, and extends north to the towpath along the Chesapeake & Ohio Canal. A stout fence, to keep out stray dogs and cats, as well as vagrant humans, envelops the whole mainland area.

Near Lock 11 of the Canal a locked gate, bearing a "posted" sign, is the main entrance to the reservation. Each member of the Club has a key, and must re-lock the gate after using it. From the gate, a woodland path winds for nearly half a mile to the rowboat ferry that provides the only access to Plummers Island. The boat, also locked, operates on an endless rope-pulley arrangement.

The day of the annual shad bake this year, May 4, saw the woods bright with blue phlox and other spring flowers. Among the fresh green foliage of the maples,



Dr. Sidney F. Blake, botanist, examines two new "finds," which will be entered in the card catalog and marked on a map of the island that is kept in the cabin.

oaks and sycamores the shrill piping of a wood thrush was answered by the chatter of red-eyed vireos and the admonition of a towhee to *drink-your-tea-sir-r-rs*. A few butterflies flapped lazily among the alders at the water's edge. Bees were everywhere, a menace not as real, however, as the shining new leaves of the poison ivy.

From the approach path the Potomac is hidden by the rocky, forested backbone of the island, whose pear-shaped mass tapers off to a long sandy spit at the down-river end. A few quick pulls on the tow rope and a jump, and we were across the back channel. The path to the cabin rises as steeply as a staircase, but is well shaded. About half way to the top a small wooden stake bears the date "March 19, 1936." This marks the crest of the great Potomac flood, an avalanche of swirling muddy water that tore trees, shrubs and plants from the lowlands, but brought with it seeds of corn, tomatoes and beets—enough to provide a good vegetable meal that year!

The rustic clubhouse has a weatherbeaten look, as it should after fifty-six years of battling sun, wind, rain and snow on the rocky summit of the island. A broad covered porch extends the full length of the cabin on the side facing the Potomac, here a deep and placid stream after its wild tumble over Great Falls, a few miles above.

Within the one-story structure there is a single large comfortable room, fourteen by twenty-eight feet, flanked at one end by a huge stone fireplace, wide enough for four-foot logs and high enough to throw out a great volume of heat. At the other end lockers hold the personal possessions of the members, while on the open



Week-end foragings by members of the Club have extended the range of certain plants, insects and birds. Here botanist Emory C. Leonard inspects the flower of a spiderwort.

rafters overhead ample bedding and cots are stored. A curtain can be drawn across this end for those who retire early.

The kitchen, in a lean-to attached to the rear of the cabin, contains the cook stove, culinary utensils, table service and staple food supplies. Water for dishwashing comes from a roof-fed rainwater tank, but drinking water must be obtained from a spring on the Virginia side of the river, a laborious rowboat trip, in addition to the climb back to the cabin. While the Club's scientists have succeeded in converting most of the island's scenery into their scientific names, they have not yet come up with a potable well or spring. Nor is electricity available.

It is pleasant to sit on the breeze-swept veranda of Winnemana, the official name of the Lodge (meaning "beautiful island" in a once-local Indian language), where the talk may range from topical matters to discussions of such specialties as Orthoptera and Hepaticae. Because of falls above the island and rapids below, there is no river traffic other than an occasional putt-putting motor boat. At night the rattling of frogs, the lonesome plaint of the whippoorwill, and the buzz of insects are all music to the ears of the true biologist members of the Club.

The shad bake is one of the three gatherings of the membership, the others being the annual meeting in April, and an oyster roast in October. The job of obtaining, cooking and serving at the social gatherings is not delegated to a caterer, but is done, with the quiet efficiency of long practice, by the members themselves. A famous mammalogist or ornithologist may be cook, and your waiter, a distinguished botanist or entomologist.

Dish washers and cleaners of the pots and pans mix talk of reptiles or lichens and mosses with the less interesting soap powder.

When the weather is fair, the food and coffee are cooked over cedar logs on big open grates between stones, and are served al fresco on a long table back of the cabin. Second helpings are definitely in order, including all the trimmings.

It is a most relaxing occasion, but I noticed some unconscious scanning of the woods, the shorelines and the sky. Biologists are never "off duty," it seems, and sure enough, a member presently came up with two botanical items not previously reported on Plummers Island. One was *Cardamine hirsuta*, a kind of bitter cress, of the mustard family, and the other *Wolffia papulifera*, of the pipewort family, which Gray's *Botany* describes as the "simplest and smallest of flowering plants, floating as little grains in or on the water."

I asked a famous botanist to identify a purple flower I had seen along the trail coming up, but I drew a blank. When I pointed it out to him, however, he very quickly called it "spiderwort," or *Tradescantia virginiana*. He admitted he had passed it a few minutes earlier, but it did not register on his mind because he had been "watching for plants he didn't know!"

The Club has also entertained at Plummers Island groups from various scientific societies, among them the American Ornithologists' Union, the American Association for the Advancement of Science, the International Congress of Zoologists, the American Society of Ichthyologists and Herpetologists, and the Botanical and Biological Societies of Washington.

Distinguished guests of the Club have included President Theodore Roosevelt, Ambassador Bryce, Dr. Frank M. Chapman, Ernest Thompson Seton, William T. Hornaday, Senator Fred C. Walcott, Justice William O. Douglas, and William D. Hassett. Each guest signs his name in the Club registry, along with any comment or observation he cares to make. As a result, the book contains frequent biological and meteorological notes, some of them of unusual interest and value, and even bits of poetry. It reveals also the constant use of the cabin, averaging a part of a day or more for at least two-thirds of the year. Some year's registrations of members and guests have exceeded one thousand, and the roster reveals the number of overnight visitors to be two hundred.

There is a deeper reason why Plummers Island is held in such veneration by the Washington Biologists' Field Club. The ashes of three of its members, Eugene Amandus Schwartz, Albert Kenrick Fisher, and Herbert S. Barber found their final resting place here. Although not members, two distinguished friends of the Club, Edgar Alexander Mearns, naturalist and surgeon, and Arthur de Carle Sowerby, famous English naturalist-explorer, asked to have their ashes placed on the property, which was done. Little wonder, then, that Plummers Island is a precious possession in the minds and hearts of the Club members!





# America's Monkey Folk

By KENNETH L. GOSNER

*Science Staff, Newark Museum*

*Illustrations by the Author*

THERE IS NO wilder sound in Nature and no voice more suited to the overpowering majesty of the tropical wilderness than the ringing challenge of howler monkeys. Indeed, a remembered image of the cathedral gloom of the jungle, its deeply shaded, green understory stippled with golden flecks of sunlight, is incomplete without a recollection, also, of the strange whoops of these largest of American monkeys.

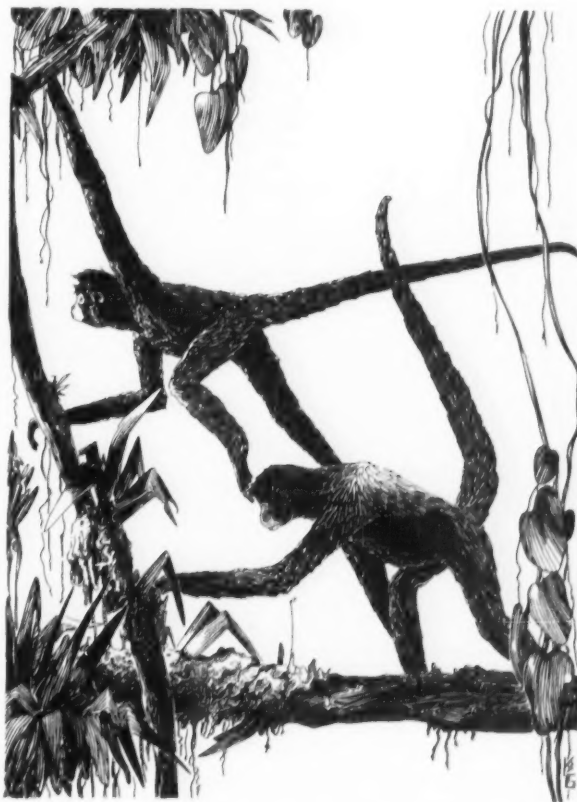
At a distance the sound is like the muffled roar of a waterfall, or a gale of wind thundering through the crown of the primeval forest. Delivered in the chill dawn, when the forest canopy is sheathed in mist, this jungle cock-crow is a nerve-shattering salute to the new day.

The vocal powers of the howler monkey are out of all proportion to the animal's size. Howlers are a good deal heavier, but not much bigger lengthwise, than the familiar rhesus monkeys of India or the local menagerie. As might be imagined, the mechanical equipment that enables them to howl so effectively is enormously developed. This includes not only the larynx, itself, but a large resonating chamber formed of the hinder parts of the hyoid bones, which in most animals are charged with no more spectacular a duty than supporting the tongue.

Howlers are stocky monkeys, heavily built and quite deliberate in their movements. There is little "monkey business" about their progress through the treetops, no frivolous, devil-may-care acrobatics, but rather a well-ordered passage along familiar aerial pathways. Howlers live in "clans," averaging between one and two dozen monkeys, and each clan wanders over an area of several hundred acres that comprises its private territory. The clans generally respect each other's domain, but any intrusions are routed, chiefly by a good deal of noise and fist-shaking rather than physical combat.

These finely furred simians—the fur is usually either black or reddish—are seldom, if ever, seen in zoos. When separated from the freedom of their native forests, they seem literally to pine away and die. A lone captive howler, particularly a very young one, is apt to present a pitiful aspect with his melancholy, black face and air of unendurable sadness. His voice is the mere whisper of a howl, and filled with woe.

When it suits their purpose, howlers can be very quiet. In the humid, lowland forest of the Peten, in Guatemala, I once encountered a troop in such a mood. The end of a long trip on muleback had brought us, in late afternoon, to a camping place in the Great Plaza of the ancient Mayan city of Tikal, a ruined city clothed in deep forest. As we made camp, a rain of small twigs, broken branches, and worse began to descend about our heads without warning. Looking up, we found a half-dozen howlers scattered about the treetops and jettisoning their missiles with what appeared to the members of the party to be obvious "malice afore-thought."



The spider monkeys, lean and wiry, progress through the treetops in graceful arcs and prodigious leaps, with assistance from a long tail that serves as an extra hand.



There was no evidence of fear in the attitude of the howlers of Tikal, or of antagonism either, aside from the rudeness of their initial welcome. Rather, we on the ground and they in the trees, eighty feet or so above, regarded each other with mutual interest. While we heated our mashed black beans and tortillas over a wood fire, the monkeys surveyed our curious behavior with an interest so mild as to suggest outright boredom. Some sprawled on their stomachs like small boys, with arms and legs dangling below the horizontal branches, gazing down at us with dark, glowing faces. Others sat upright, half turned their backs to us, and munched bits of foliage within easy reach. As darkness settled over the forest, they left, and we heard no more of them until their clarion calls rolled over the ancient and desolate city an hour or so before daybreak, putting end to all thought of slumber.

The howler is called *araguato*, a sonorous, guttural-sounding name that fits the beast just as *mico*, pronounced mee-co, is appropriate to the spider monkey. The two species inhabit the same forests. Although their personalities are quite different, their paths cross without friction. Mico is a monkey's monkey, an acrobat whose grace and spirit approach that of the Old World gibbons, which are, perhaps, the most superb aerialists of all the primate kind. The progress of a group of spider monkeys through the treetops is a fluid unwinding of arms, legs, and tails in sweeping arcs and prodigious leaps. In a moment they have come and gone.

Where the howler is stolid and muscular, the spider monkey is lean and wiry, with incredibly long arms and legs. Mico's tail is almost twice as long as his body and, like that of many other New World monkeys, functions as an extra hand. Old World monkeys do not have such prehensile tails. In order to improve its grasping power, the underside of the tail in both spider monkeys and howlers is hairless.

While spider monkeys are less belligerent-looking in the field than their more powerful cousins, they share the howler's low opinion of mankind. Their tactics are more of the hit-and-run sort, however. Once, in those same forests of the Peten, we met a corps of micos shortly after a heavy summer downpour. Everything, above and below, was wet, and when the spider monkeys passed overhead, I am certain that they shook the sopping foliage more than was really necessary, scattering a brief but considerable shower of chill droplets upon us.

Mico is a highly specialized monkey. Frequently he has no thumb, or only a rudiment thereof. The loss of



The strange whoops of the howler monkeys sound through the wilderness of tropical America, a ringing challenge in the gloom of the jungle.

this classical key to intellectual development has apparently blocked the spider monkey's progress in mental matters. These graceful creatures, although often seen as house pets in the tropics, are not as engagingly mischievous as another American monkey, the capuchin.

The capuchin is the white-faced monkey with the crew haircut, and dark shoe-button eyes. In the past, when the organ grinder was a more common sight, the capuchin was his most frequent assistant. His face is exceptionally expressive, and apt to assume a totally false mask of bland innocence. In captivity, capuchins have a genius for exploration. Their intense interest in all that goes on around them is at once a winning trait and a source of exasperation. They are quite capable of throwing things with disturbing accuracy, if

thwarted in some project. Another trait, which perhaps reflects a natural danger, is their consistent aversion to cats and to anything resembling a snake.

This small monkey is about the size of a large housecat, and is not so specialized in anatomical features as either the spider monkey or the howler. Capuchins are well-furred; the tail is covered with hair all the way around, and is not so strongly prehensile as that of the other species. The capuchin is, also, more catholic in its feeding habits. Howlers and spider monkeys appear to be strict vegetarians, but white-faced monkeys dine well on birds' eggs and young birds when in season, and a variety of insects, as well as fruits and such delicate fare as flower petals. They are in turn occasionally eaten by ocelots and some of the larger tropical hawks and eagles. It has been suggested, on the basis of experiments in the field of color perception, that the capuchin occupies the rung just under the rhesus monkey on the evolutionary ladder.

The capuchin, howler, and spider monkeys are only three of the more familiar and widely distributed New World primates. There are, besides, a varied assemblage of other monkeys and marmosets that, together, form a unique segment of the fauna of the Americas. In the warmer lands of the Western Hemisphere the roar of the howler is as familiar a sound in the hinterland as are the tuneful whistles of marmosets in the northwestern United States or the scolding chatter of red squirrels in the East. Where squirrels and other diurnal mammals are rather scarce, and where the large, furred creatures like jaguars and tapirs are timid and elusive, monkeys are often the most conspicuous animals to be found abroad by day.





# Nature Makes a Point

By JOHN M. HALLER

Photograph by Gillis King

"Do not grieve," says the Arabian proverb, "because the rose-bush has thorns. Rather be glad that the thorn-bush bears roses."

We all know that every rose has its thorns. Goethe wrote one of his best-known poems about plucking a

rose; which, alas! did not fail to punish him. And exactly the same figure is used in one of the most popular Mexican songs. The beautiful plant and its thorns has given rise to many a figure of speech. Although apparently simple, thorns are among the most interesting parts of a tree. Consider their diversity. They come in all sizes, shapes, and colors, from the tiny, hooked thorns of the desert legumes to the ten or twelve-inch compound thorns of the honey locust and the water locust, branched like the antlers of a stag. Some, rose-like, are triangular or pyramidal, like those of the kapok tree or silk-cotton tree, *Ceiba pentandra*, which stud trunk and limbs so thickly that climbing is not to be considered. Some are wickedly curved at the tip, seemingly especially made to tear the flesh of intruders, such as the Texas catsclaw, *Acacia greggii*. Some are long and straight like an ice-pick, shaped for piercing, such as those of the mesquite, the haw, or the locust. Such a thorn, by accidentally sticking an individual in the neck, the eyes, or some other vulnerable spot, could conceivably produce death. In Norse mythology, Balder was killed by a sprig of mistletoe thrown at him by his evil brother, Loki. How much more convincing had the missile been a thorn!

Some thorns occur singly at irregular intervals. Others occur in pairs. Some, like those of the Jerusalem thorn, *Parkinsonia aculeata*, are reinforced by two smaller thorns, one on each side. Others occur in clusters, like the much-cited locust. Some are green, some brown, some black, some gray, some yellow, some red, some purplish. Some are tiny bristles surmounting a boss-

like excrescence, such as those of the curious tooth-ache tree, or pepperwood, *Zanthoxylum clavaherculis*. Many, believed to be modified branch shoots, jut out defiantly, straight from the trunk, without special preparation. Others, very strange, have no independent existence as

such, being rather the pointed tips of growing leaf-bearing shoots. Of this order are the thorns of the little-known gum elastic or woolly bucket bumelia, *Bumelia lanuginosa*; the sloe, and the wild pear.

In some cases thorns are only modified leaves, as with the barberry. The petiole of a pinnately compound leaf may persist as a thorn after the leaflets have fallen. (Many petioles that are not thorn-like also thus persist, like those of the Jerusalem thorn, the tree of heaven, and the chinaberry.) Many thorns are obviously modified stipules, occurring in pairs at the base of each leaf.

In some trees the thorns are important features of identification. When the botanist gets to the hawthorns, for example, he is thankful for the thorns. Whether they are long or short, straight or curving, swollen at the base or unswollen, is often a helpful guide through this botanical labyrinth.

Generally, the thorniest plants are found in desert regions, where the struggle for existence is fiercest. Among trees we have the mesquite, huisache, Jerusalem thorn, guajillo, catsclaw, Texas ebony, palo verde, huamuchil, tamarindo, and many, many others. Nearly all the cactuses are covered with thorns, including the tree-like saguaro and most of the lesser forms. The imposing Joshua tree, *Yucca brevifolia*, has leaves that terminate in efficient thorns; another, smaller form of yucca is called "Spanish bayonet."

Certain birds turn the thorn trees to account by building nests in them. The southwestern roadrunner, for example, uses the thorniest of the cactuses for its home, as does the desert woodpecker. Even the wildcat



The trunk and branches of the honey locust often bristle with a formidable array of compound thorns that are a development of buds within the wood.

will climb the thorny saguaro in time of need—and was photographed in the act by Walt Disney, in *The Living Desert*. Some mammals, such as the giraffe, are adapted to browse on thorn trees. Even man finds a way to get past the thorns, if the reward is great enough. Thus, he sings the thorny *Opuntia* leaf in order to feed it to his cattle, and he picks the prickly pear from the same plant for his own consumption, even though by doing so he frequently gets thorns in his hands, tongue, and sometimes his eyes.

In general, however, the thorn serves its purpose quite effectively, inspiring aggressors with a healthy respect. If animals could talk, their equivalent of our proverb: "The burnt child dreads the fire" would doubtless be: "The stuck cub shuns the thorn." So widespread and so successful are thorns that certain insects mimic them, coming to rest with folded wings on a tree or bush in exact imitation of that plant's thorns, like the jungle butterfly that mimics a dead leaf.

As might be expected, man has found a use for thorns. In primitive states and rustic communities he uses them for needles, pins, fishhooks, toothpicks, even weapons. The writer has seen Mexican women stick a thorn into potatoes, as an American housewife sticks her fork in, to see whether they are done; and he has seen Mexican men stick a long thorn into each end of a hot *elote* (corn on the cob) in order to hold it while eating. He himself has used one thorn to pick another one that has become lodged in his skin.

Some cylindrical thorns will do duty as rudimentary pens; in fact, they probably preceded the goose-quill in this capacity. One of the most interesting modern uses of the thorn is for phonograph needles, a kind of cactus thorn being preferred. Its hollow structure, resonant quality, and comparative harmlessness to the record make it continue in favor, despite the development of different kinds of "permanent" needles.

An article on thorns with no mention of the cornezuco, or bullhorn acacia, would be like an article on American Presidents with no mention of Washington. Cornezuco, or *Acacia cornigera*, is a small, thorny tree found scattered throughout most of the desert and semi-desert parts of Mexico, a member of the great legume family and the genus *Acacia*. Many similar trees and shrubs bear the same name, some even in the same genus.

The plant particularly referred to here is of interest because of the intimate association established between it and a certain kind of ant. For the thorns of the cornezuco have the shape of horns; and each thorn, or "horn," is two to three inches long, hollow, much enlarged toward the base, and gradually tapering to a point. About half an inch or so back from its tip there is a small hole, which is the front door to the ant colony within.

Like bees in a hive, or squirrels in a hollow tree, these ants live inside the cornezuco's thorns. An odd place for a home, perhaps, but a most convenient and a highly successful one! Be it ever so humble, they seem to like it, and they defend it with the kind of courage, ferocity, and concertedness of effort that our civil defense leaders must dream about.

When the thorns are green, the ants leave them alone. When they reach mature size and begin to harden and dry, the insects systematically colonize them, chewing out a front door, cleaning out the inside, and formally taking up residence. Their community is thus a progressive one, and their economy dynamic. As the tree grows, and new thorns appear and gradually mature, the ants continually expand their holdings. Their colony steadily extends itself, like a man-made city growing out into new subdivisions. The population growth of the colony automatically keeps pace with the growth of its particular tree. Imagine the real-estate boom when a new crop of trees shoots up in the spring!

Examination of the little tree should proceed with caution. The slightest movement of a branch brings the ants out of their thorns to investigate, and if the tree is violently shaken, the ants will almost instantaneously boil out, spewing over the attacker before he has a chance to get out of range. Few, if any, terrestrial insects can move as fast as an angry ant. These thorn-dwellers move, or seem to move, even faster than the ants living in the ground.

The relationship between the ants and the trees is mutually beneficial. The ants defend the tree against attack, and the tree provides them with a home. "No contract," wrote Justice Brandeis, "is of value unless it benefits both parties." How the great jurist would have been pleased with the curious examples of contractual faith scattered about over the Mexican desert!

## DAY IN NOVEMBER

*I didn't think that God could make  
A day so bushed and clear,  
So filled with gold and blue and light,  
And you no longer here.*

*But as He loosened from the trees  
Each singing yellow leaf,  
I wondered if He knew their song  
Could still an anguished grief.*

Helen Mitchell

# Fifty Years of Nature Study

## and the American Nature Study Society

By E. LAURENCE PALMER

*This is the ninety-third of NATURE MAGAZINE's  
special educational inserts.*

JANUARY, 1958, marks the beginning of the second half-century of the existence of the American Nature Study Society. Since the Society has been an important factor in the growth and evolution of the nature study movement, it is appropriate that this educational insert be devoted to these past fifty years. Also, the American Nature Association and *Nature Magazine* have collaborated closely with the Society and have furthered many of its educational responsibilities.

More and more funds and professional support are becoming available for the advancement of science education in its broader aspects. Equally, there is more and more competition for these funds and for this support. Historically in education, there have been many educational fads, temporarily winning public support. However, through it all, there are fundamental truths that must be accepted, and any honest student must recognize in the nature study movement values that are essential. We wish to call attention to some of these values. We must first accept the validity of a philosophy that asks that one look to proof for authority, rather than to authority for proof. And the essence of nature study is that we "study nature, not books." There have been and will be attractive fields to explore in which camping, recreation, health, and citizenship suggest ways of advancing "the nature study idea." A position of leadership in conservation, for example, is being sought by recreation leaders, many of whom have scant understanding of the real significance of conservation. The term science has been abused by many who have little concept of what science really is and little desire to submit to the disciplines necessary for such understanding. We tend to determine what we do in part by seeing how the pack is running, buying cars that sell in the greatest numbers, smoking cigarettes that are smoked by public figures, and supporting movements that are urged by the ablest propagandists. By none of these methods can truth be determined, and by truth alone can progress continue. Some of us feel that the nature study movement has features that are unquestionably fundamental and vital. It is to propound these truths that this summary of a half-century of nature study is given.

for November, 1957

## The Seeds of Nature Study, before 1800

TO UNDERSTAND any organism it is essential to consider its structure, how it works, what it does, and to know something of its ancestry. This is true whether it is a pine tree, a swamp, or a professional organization such as The American Nature Study Society. To know how it came about may be as important in understanding it as to see what it does today, did yesterday, or to predict what it may do tomorrow. The philosophy of the Society was evolved over a span of many years by some of the best of minds.

Comenius was credited with producing, in the 1600s, the world's first pictorial school book. In doing so he said: "Since the beginning of knowledge must be through the senses, the beginning of teaching should be made by dealing with actual things. The object must be a real, useful thing, capable of making an impression on the senses." He suggested that geography "begin with the study of the child's room," that "instruction must begin with actual inspection, not with verbal description."

Writing in 1749 of his proposals relating to the education of youth in Pennsylvania, Benjamin Franklin said of nature study: "Besides this Study, if it is to be called a Study, instead of being painful and tedious, is pleasant and agreeable.—A Garden, a Country, a Plantation are all so many books which lie open to them [children]; but they must be taught and accustomed to read in them."

During the first half of the eighteenth century in America began the production of a literature about our plants, animals and mineral resources. In this, the names of Mark Catesby and John Bartram were prominent. In the last half of the century Alexander Wilson and John James Audubon described our birds; Peter Kalm, the Michaux family, and the Bartram family's second generation wrote of plants. All of these men studied their science first hand. They had no choice, for we had scant American literature in the field of nature study.

In Europe, Gilbert White was writing intriguingly about the tortoise in his garden, and of other things he saw, in his classic *Natural History of Selborne*.

Even though war raged in Europe and in America it was fought along more gentlemanly lines than modern warfare. The British army that moved into Philadelphia had orders not to harm the Bartram gardens because of what they had meant to European biologists.

The educator Rousseau described his education "according to nature" and wrote: "In general never substitute the sign for the thing itself, save when it is impossible to show the thing, for the sign absorbs the attention of the child and makes him forget the thing itself."

By the end of the century Pestalozzi, who definitely affected American nature study, was becoming influential.

## A Century of Nature Growth—1800-1899

THE FIRST half of the nineteenth century finds Pestalozzi hammering away in Europe on the idea that sense perception is the basis of all knowledge, while Froebel added to this philosophy a religious and a practical significance. Froebel emphasized the use of agricultural materials as a basis of learning, feeling that learning was improved if the child participated in intelligent management of affairs of living things. Agassiz influenced Old World thinking about natural history in this period.

America was boiling with activities of interest to nature study. Thomas Say, under the Bartram influence, had begun to create an American entomology and zoology. Audubon reached his climax in this period, and Maclure was helping to make an American geology. He was identified with the brief New Harmony movement, which began in 1825 and laid an educational mosaic that eventually, in one way or another, enjoyed wide adoption. Botany came into the programs of the academies in 1800 and zoology in 1825.

It was in 1847 that Edward Sheldon had to leave Hamilton College because of ill health. He became concerned over the education of his home town folks after he found that in Oswego, New York, there were 1500 illiterates. To correct this situation he started his own school for 125 youngsters without any specific philosophy and with no budget. The results that he obtained were phenomenal.

In 1859, Sheldon went to Toronto to improve his ability as a teacher. There he saw a demonstration of the Pestalozzi system of teaching from objects. He was overwhelmed, returned home and, in 1861, started his own teacher-training program. In 1863, he demonstrated his philosophy of object-teaching to the National Education Association, and in 1865 New York State took over his teacher-training program and at Oswego started the "mother of American normal schools."

In 1862, H. H. Straight suggested the appropriateness of studying things in a natural rather than an unnatural setting, and in 1870 Harris published in St. Louis his syllabus of lessons in nature study. This was the first such syllabus published in America and proposed an organized sequence of studies.

In 1873, Agassiz had his famous summer school at Penikese, which set a pattern for American biology for many decades. At that school were a number of the founders of the American Nature Study Society. Agassiz emphasized self-stimulated investigations of real materials.

By the end of the century Chicago had been greatly influenced by Straight and also by Wilbur Jackman, who, in 1891, published his *Nature Study for the Common Schools*, which asked but did not answer questions.

High school interest in science shifted toward the end of the century. Morphology began to replace natural history. By 1880, 78 percent of the high schools of the Northeast were teaching physics. This should cause some thought today, when the teaching of physics, in quantity and quality, lags behind the national need.

## At the Century's Turn—1900-1907

THE SEVEN years immediately preceding the founding of the American Nature Study Society were most significant. Man's thinking seemed to be in a state of flux. Maurice Bigelow, a well-trained biologist, began teaching biology at Teachers College, Columbia. This was in 1899, the same year that Liberty Hyde Bailey had offered a summer school program at Cornell for nature teachers. Cornell had just founded the first forestry college in America and Yale followed suit the next year.

Under the guidance of able scientists the Department of Science Instruction of the National Education Association had been formed in 1895, and in 1900 the publication of *School Science and Mathematics* began, in part, to provide a medium of expression for those interested in teaching science. In 1903, the magazine's supporters formed the now powerful Central Association of Science and Mathematics Teachers. In 1901, Jackman, often called "the father of nature study," became dean of the School of Education at Chicago. In 1904, he published the Third Yearbook of the National Society for the Study of Education, which dealt with nature study fairly, and which proposed a regular cycle of physics, chemistry, geology, astronomy, botany and zoology, but apparently was not read critically by those who later prepared the 31st Yearbook of the same organization. The Third Yearbook is still well worth reading.

In the following year, 1905, L. H. Bailey published his classic *The Nature Study Idea*, the first national forestry congress was held, and Bigelow of Columbia started *The Nature Study Review*, which three years later, in 1908, became the official organ of the newly organized American Nature Study Society.

The driving force of this group was Bigelow, but associated closely with him were Bailey of Cornell, representing agriculture; Hodge of Clark University, representing biology; Fairbanks of California representing geography, and Woodhull of Columbia, representing the physical sciences. Working with these men was a group of 62 scientists and educators in the United States, Canada and abroad. In the list, we read such well-known names as Miall and J. Arthur Thomson of England. Among the Americans were Locy, Needham, McBride, Vernon Kellogg, W. F. Ganong, Stanley Coulter, and Frank Chapman, known to every biologist by their writings if for no other reason. There was also Carver of Tuskegee, known affectionately for his service to his race and to society in general. Among the educators were such men as Boyden and McMurtry. These were the people who served as midwives for the new Nature Study Society.

It is probably significant, too, that in this period the influence of President Theodore Roosevelt was great through the land. In the year before the Society was formed, or in the same calendar year, our National Forests were increased tremendously. The Reclamation Act was implemented by an independent government agency. About this time forestry schools appeared in Oregon and in Washington.



## The First Decade—1908-1917

ON JANUARY 2, 1908, at the University of Chicago, The American Nature Study Society was formed. L. H. Bailey, chairman of the organizing committee, was unable to attend and the meeting was opened by Otis W. Caldwell, the vice-chairman. It was agreed that "nature study adapted to young children differs sufficiently from the science of higher schools to warrant the name 'nature study' at least as a matter of great convenience." In a discussion with the writer years later Caldwell expressed his conviction that nature study had a major significance beyond the elementary school, and it would seem that history has borne out that viewpoint. Bailey held that nature study involved learning to see what one looked at and drawing proper conclusions from what one saw.

At this initial meeting, Stanley Coulter said: "It is doubtful, indeed, if any modern educational movement has been so hampered by definition, so obstructed by material, so deflected by sentimentalism." Its survival he said was "evidence of the vital quality of the movement." He said that it is "regarded as a movement to relate education to daily life," and to "accomplish this end by a wise training of the senses, using for its material the natural objects or phenomena surrounding the child." He said "the material should be as varied as the surroundings demand," and that it was "measured in an attitude of mind in the presence of facts." Other speakers of equal caliber agreed essentially with Coulter's analysis of the situation.

Some of the speakers emphasized aspects that they thought were "the matter with nature study." Hodge, for example, felt that much that was considered to be suitable lacked significance in the life of the child. His book *Nature Study and Life* had a title that indicated this interest. He emphasized the importance of a sound education during the period when we face the "problem of feeding the human soul and mind during its period of active growth." One of the attacks on nature study made twenty years later justly pointed out the fallacy of implying such limitation of the growth of the human mind to the earlier years of life. Hodge also emphasized responsibilities greater than those of the individual as being of major importance.

C. R. Mann of Chicago devoted much attention to weaknesses in what was accepted as science and which nature study might correct. He preferred to define science as "problems solving" rather than as "organized knowledge," and felt that both lacked the spontaneity that the nature study idea might provide. He felt that the good of both schools of thought should be joined, and that really there should be no difference between nature study and science. He suggested that a major responsibility of the Society was to develop a research problem in education that should be solved by methods of science. He concluded with the hope that nature study teachers would "take enough work in science to have mastered the subject matter to a sufficient degree." It would seem that such a warning might with equal justice be given to teachers of science, as well as teachers of nature study.

For the first decade of the Society, the presidents who helped define the nature of the organization were as follows: Liberty Hyde Bailey, 1908 and 1915-17; C. F. Hodge, 1909; Otis W. Caldwell, 1910; B. M. Davis, 1911-12, and Anna Botsford Comstock, 1913-14. In 1911 Mrs. Comstock had first published her *Handbook of Nature Study*, now in its twenty-fourth edition and still a best-seller in its field. It was based largely on experience gained through junior Nature literature published at Cornell since 1896.

The period marking the beginning of the Society was rich in literature. It included works by Holtz, Schmucker, Rogers, Hodge and others. The year in which the Society was formed was also the year in which the Federal government established 36 wildlife refuges, the year when the present Grand Canyon National Park was established as a National Monument, and the year when Theodore Roosevelt called his famous Joint Conference of Governors, which led almost immediately to the establishment of conservation departments in almost all of the States. It was a dynamic year, with dynamic leadership in strenuous times.

During the first decade of the Society, the Boy Scouts of America were organized (1910) and the Girl Scouts and Camp Fire Girls (1912). The first junior high school in America had been established in Columbus, Ohio, in 1910. The School Garden Association had been formed. The Agassiz Association (1908) began the publication of *The Guide to Nature*, and Bailey had developed the program initiated by Roosevelt's Commission on Country Life.

This was the decade in which general science began to come to the fore and found expression largely in the publication of texts. The *General Science Quarterly* began publication in 1916. Later it became *Science Education*. Many colleges of forestry were established following the establishment of State conservation departments that had been stimulated by Theodore Roosevelt's Joint Conference of Governors. Among these States were California, Massachusetts, Idaho, Colorado, and, in New York State, the forestry college at Syracuse University.

During this period, some heated discussions on Nature and wildlife began to appear. Theodore Roosevelt had his ill-advised controversy with Abbott Thayer about concealing coloration. William T. Hornaday, who had spent much of his life collecting large game for use in museums, became aroused about the fate of wild animals and wrote his energetic *Our Vanishing Wildlife*. In 1917, the National Park Service was established and gave a dignity to national park work that it had not previously enjoyed.

In the field of education the National Society for the Study of Education published its 15th Yearbook, which had some bearing on the problems of high school science, and a few leaders made shifts which were subsequently significant. In 1912, David Starr Jordan headed the Department of Science Instruction of the National Education Association. Caldwell went from Chicago to Columbia in 1917.

## The Second Decade—1918-1927

IN THE second decade of the American Nature Study Society, many of the responsibilities that the Society had carried began to be assumed by other more specialized groups. New leadership appeared along with new opportunities and new difficulties. Literature appeared that made it easier to do good work in the nature study field, and some that made it more difficult. Financial support appeared and financial obligations multiplied. It was an interesting decade.

During this decade, the affairs of the Society were administered by five persons—three represented teacher training institutions, one a forestry school and another the supervisory field. Of major importance and significance was the recognition by the Federal government of responsibility to support training in agriculture and in home-making. Much of this work had been supported by the nature study leadership, and new leaders appeared with the new development. 4-H Clubs were doing much of the work previously done by the nature study leadership if we examine the literature at the beginning and at the end of the decade. This represented a natural, normal and encouraging growth of public interest in views originally sponsored by the Society.

It was during this decade, in 1922-23, that publication of the Society's official organ *The Nature Study Review* was discontinued and *Nature Magazine* began to assume some of the responsibilities it had carried. This was made possible by generous support from the Pack organizations in many ways.

The first five volumes of *The Nature Study Review* had been edited by M. A. Bigelow of Columbia. Volumes 6 and 7 were edited by Frederick Charles, of Illinois, who died in 1911. B. M. Davis of Miami edited a few interim numbers and was succeeded by Elliot Downing of Chicago, who edited volumes 8-12. Anna Botsford Comstock of Cornell edited the last four volumes. She continued in a school editorial capacity with *Nature Magazine* subsequent to the dropping of the *Review*.

The Society's presidents during this decade were: S. C. Schmucker of West Chester, Pennsylvania, Normal School and author of *The Study of Nature*, 1918-19; J. Andrew Drushel of St. Louis and later of New York University, 1920-21; W. G. Vinal, of Rhode Island School of Education, later of Western Reserve, Syracuse, Massachusetts and Boston Universities, author of *Nature Guiding* and founder of the Nature Lore School 1922-23; George Green of Pennsylvania State College 1924-25, and M. R. VanCleve of Toledo, Ohio, 1926-27. Each of these individuals gave different emphases to the work of the Society. Vinal and Green in particular added strength to those interested in teaching Nature work through the channels of camping. Drushel gave the Society a high professional standing, and VanCleve gave the views of a supervisor. Schmucker recognized a fine religious significance in Nature work. Schmucker, Drushel and Vinal had all completed their doctorates in a field of academic science. These men made contributions of considerable significance in terms of the leadership that developed in the succeeding decade in fields related to the nature study work.

During the second decade of the Society's existence a number of changes took place that had importance in subsequent developments. Powers and Craig began their work at Columbia, and the influence of Caldwell and Bigelow waned there. Curtis began his work at Michigan. Drushel went to New York University and Pieper was working at Chicago. Palmer came to Cornell during this period and began his editorship of *The Cornell Rural School Leaflet* and his work with *Nature Magazine*.

There may be some significance in what was taking place outside the direct influence of the Society. At the beginning of the decade, in 1918, The American School of Wildlife Protection was founded at McGregor, Iowa. Within a few years The Nature Lore School was founded in New England and the Yosemite School of Field Natural History in California. The National Parks Association was formed in 1919 to provide an advisory group to the government units controlling our national parks. In 1921 the first National Conference on State Parks was held. The succeeding year The American Nature Association and the Izaak Walton League of America came into being. In 1924, the Camp Directors Association was formed and the first Yearbook of the American Nature Study Society was published.

The Coordinating Council on Nature Activities, sponsored by Bertha Chapman Cady and supported by Rockefeller funds, came into being in 1925 with the valid idea of preparing core material of use to the many agencies that were developing in areas where there was a common need for sound help in the nature field.

In 1926, the first of many editions of *The Forestry Primer* of The American Tree Association, a Pack organization, appeared, and the Department of Superintendence of the National Education Association published its Fourth Yearbook dealing with nature study and elementary science, but possibly not representing the pooled judgments of the supporters of either field. In that same year, Frank published his *How to Teach General Sciences*; Curtis published his first *Digests* of research in science teaching; Jennie Hall and Eva Gordon of Minneapolis published their *Nature Stories for Children*, and the Anti-Steel-Trap League came into being. That year, L. H. Bailey was the president of the American Association for the Advancement of Science and the American Nature Study Society gained representation on the council of that organization.

In the last year of the decade, The American Nature Association published the first *Nature Almanac*, prepared by Arthur Newton Pack and E. L. Palmer with the cooperation of most of the Society's leadership, and Craig published his doctorate thesis outlining his convictions on how science in the elementary school should be developed.

As stated before, many of the responsibilities that had belonged to the Society at the beginning of the decade were being assumed by other groups. This alone should be evidence of the importance of the field that was becoming recognized by the government, by foundations, and by professional groups. What more could be asked?

## The Third Decade—1928-1937

MANY OF the trends started in the second decade of the Society's existence continued in the third. A few new areas of opportunity appeared to catch the attention of the public, and some of these are of current importance. Some groups that ignored the nature study philosophy, enunciated at the beginning by the Society, find themselves today in a world that recognizes the soundness of that philosophy. It was in the third decade that many important dies were cast, most of them, to be sure, a refurbishing of features that had had recognition earlier. For example, during this decade textbooks for teaching science and Nature work in the elementary schools began to appear in abundance, but they did not equal the flood tide of the next two decades. A renewed interest in conservation work was aroused during this period, but it was hardly of sufficient importance to forecast the interest of the present time. A strong group began to "play down" the term nature study in favor of the term "elementary science," in complete disregard of many of the teachings of the past. All of these phenomena and developments made the decade an important and an interesting one.

As in the preceding decade, five persons held the Society's leadership from 1928-37. These were Bertha Chapman Cady, 1927-29, who had directed Nature work for the Girl Scouts and for the Coordinating Council of Nature Activities; A. F. Satterthwait, 1930-31, an economic entomologist at the time representing the Webster Grove division of the Society; Ellis Persing, 1932-33, of Cleveland, Ohio, author of a series of elementary science texts; E. L. Palmer, 1934-35, of Cornell and *Nature Magazine*, and Edith M. Patch of Maine, author of several Nature books for children and of a popular series of elementary science texts, 1936.

During this decade, the Society had no official publication other than space that was available through the pages of *Nature Magazine*, and no means to keep the group together except the annual meetings. Dr. Cady severed her connections with the Girl Scouts at the beginning of her work with the Coordinating Council and worked rather closely for a while with the American Museum of Natural History. While she had been able to get funds for the financing of the Council, and had reason to be encouraged for the future, the depression set in and it became difficult to get support such as she had received in the past.

It may be best to give a chronology of the decade rather than to deal specifically with the functioning of the Society for this period.

In 1928, the National Association for Research in Science Teaching was founded. It attempted to assume responsible leadership for coordinating research in science teaching generally. Two years after it was organized it purchased the *General Science Quarterly*, which was facing difficulties, and, in its place, gave us *Science Education*. This organization has had almost invariably as its leaders those whose basic training has been in the field of professional education and contended with justice that an obligation existed to win the support of school administrators if a school program in the sci-

ence field was to make progress. It was many years before this group was identified with the American Association for the Advancement of Science, and then it was with the education division.

In 1928, the Pack Foundation, through the American Nature Association, established at Cornell their fellowships in forestry and Nature education. In 1936 emphasis was changed to conservation education. These fellowships helped more than fifty persons to gain their doctorates. Almost all of them now in service are in teacher-training work, and many, including the present president, treasurer, and secretary of the Society are playing important parts in the functioning of the Society.

In 1930, Dr. Harold Bryant, long prominent in the Society, became director of education and research for the National Park Service. In that capacity, he had the opportunity and the ability to establish a valid Nature program for the interpretation to the public of the resources of our national parks. In the same year, The American Nature Association published the second *Nature Almanac*, prepared again by Arthur N. Pack and E. L. Palmer. Also in that year San Jose State College in California began publication of *Western Nature Study*.

In 1931, Hornaday published his famous *Thirty Years War for Wildlife* in which he summarized the difficulties of that period in getting public recognition of the tragedy of our vanishing wildlife. The present public support of that general program may stem largely from the aggressive Dr. Hornaday and his contemporaries.

In 1931, the American Tree Association backed the publication of *Forest Facts for Schools*, which was designed to implement for school use what was known in the forestry field.

The field of forestry and wildlife management progressed during the years following the publication of this book. Unfortunately it cannot be said that the book was responsible for these developments. In 1935, The American Game Protection Association became The North American Wildlife Institute (now the Wildlife Management Institute) and The Wilderness Society came into being. The next year, 1936, President Franklin Roosevelt called the First North American Wildlife Conference, which has served effectively ever since to guide the work of wildlife conservation education and management, and which gave birth to the National Wildlife Federation.

To return to the science education field, we find these events of importance. In 1932, Craig published his *Pathways in Science*. The same year there was organized the Northeastern Conference in the Education of Teachers in Science, and the National Society for the Study of Education published its Thirty-first Yearbook on *The Teaching of Science*. It seems unfortunate to some that this Yearbook undertook not only to destroy the work in nature study but to ignore rather completely much of the sound philosophy advanced by Jackman in the Third Yearbook by the same organization.

At the end of the decade there were 5000 junior high schools in the United States, a remarkable growth from the first school in 1910.



## The Fourth Decade—1938-1947

THE SOCIETY's fourth decade, like its third, saw a continuation of the assumption by other organizations of responsibilities that had originally been assumed by the American Nature Study Society. To some, the period was discouraging. To others, it was obvious that a change of direction must eventually take place in the field of science education and it would seem that this became increasingly evident in the fifth decade.

During the period from 1938-47, the affairs of the Society were the responsibility of another five leaders, although Edith M. Patch served as president the last year of the third decade and the first year of the fourth. The presidents for the other years were as follows: Ellen Eddy Shaw of the Brooklyn Botanic Garden, 1939-40; George Free of Pennsylvania State College, 1941-43; Charles Mohr of Philadelphia and later of the National Audubon Society, 1944-46, and Edwin Way Teale, the Nature writer, 1947.

Without an official publication of its own, the Society had faced considerable difficulties for some years. Finally under the administration of Ellen Eddy Shaw, a way was found to identify membership in the Society with support of *Nature Magazine* and of *Canadian Nature* through group subscriptions. This provided the Society with a better source of revenue than had existed and made possible more effective work, including the publication of the *News Letter* through which information on the activities of the Society and its members could be circulated. This arrangement has been continued and the *News Letter* is a catalyst.

This was the decade of World War II with its impact on all of the affairs of all men. As is the case in all wars, our institutions of higher learning found their classrooms empty. A generation was learning what it meant to live next to reality and to be prevented from living lives characteristic of the years of peace. Men at the front lines were living close to nature. Men at home were facing challenges on every front. Nothing was inert except institutions and individuals that for one reason or another were insulated from life and untouched by change.

Following the publication in 1932 of the 31st Yearbook of the National Society for the Study of Education, there had been a period in which it seemed easier to teach your science from a textbook than from your own immediate physical environment. Generalizations were the watchwords of the times and deductive thinking took a place in science programs where induction had been advocated by the nature study philosophy. Education began to flourish like the green bay tree. The higher echelons of science teaching were becoming manned by Ph. Ds. in science education, many of whom were inadequately trained in academic science. Bandwagon techniques were recognized as important. Elementary science textbooks that could not possibly be approved by any well-trained scientist were accepted as gospel by school administrators and by some science teachers, and sold in numbers that assumed an authority actually in inverse ratio to the scientific value of the work. The uncertainty, fear and dedication to getting

a job done characteristic of the first half of the decade was replaced in the latter two years by relief from worry and unconcern about dangers that were not too evident.

It would seem unfair to make generalizations about invalid textbooks without being at least slightly specific. One of these books, prepared by a high-ranking science educator with a doctorate in the education field, is a part of a series of books which, for ten years, had great popularity and was revised and adopted on the West Coast within the past five years. In it, we are shown a picture of a fight between a Cretaceous dinosaur and a Jurassic dinosaur, which lived on the earth millions of years apart. Such a fight would be worth seeing. Another picture shows a Jurassic dinosaur meeting a Cretaceous dinosaur head on, and still another shows a plesiosaurus labelled as an "ichtyosaurus." This series of books, crowded with such errors, has been used regularly in our public schools from coast to coast for more than 15 years. How could this sort of thing possibly have occurred had we followed Comenius' recommendation of the 1600s that "the beginnings of teaching should be made by dealing with actual things," or Coulter's recommendation at the initial meeting of the Society that we should advance our interests by "using for material, the natural objects or phenomena surrounding the child?" Thus the writer has felt justified in repudiating much of our so-called current "elementary science."

He supports without apology "nature study" as it was advocated by the founders of the American Nature Study Society, although he agrees with many of the founders that there *should* be no great difference. At the initial meeting of the Society, Mann recommended that nature study teachers "take enough work in science to have mastered the subject matter to a sufficient degree." It would seem that this rule should apply also to pre-college science teachers and to writers of school textbooks, to supervisors and to holders of Ph.Ds in science education.

It might be well to indicate here that the first Yearbook of the American Nature Study Society declared that nature study material should be local and seasonal, that it include both biological and physical science aspects. It also stipulated that it be organized progressively. It emphasized developing acquaintance in the world in which the learner lives through direct observation, and decried sentiment.

During this fourth decade of the Nature Study Society, the National Association of Biology Teachers was founded, in 1938, and, in 1944, the National Science Teachers Association united the National Council of Science Teachers and the American Science Teachers Association. During recent years the National Association of Biology Teachers has worked closely with the American Nature Study Society in joint meetings and in other fields. During this period *Canadian Nature* began publication and has found many common interests with the Society. As the decade closed a tendency developed to emphasize recreational aspects of Nature work.



## The Fifth Decade—1948-1957

POSSIBLY the fifth decade of the existence of The American Nature Study Society may be considered as a period of reckoning and of dedication. Certainly anyone cognizant of the picture for the last half-century should feel greatly encouraged by much that has happened in the past five years, and in particular in the past two years. Unfortunately some developments may be reminiscent of the behavior of an inebriated man of the sea. Practically everything may be taken as a challenge to take advantage of existing circumstances and to take measures to safeguard the future in every way. This dual obligation calls for sound judgment and unselfish dedication to valid programs. Anyone who contends that precollege and college science teaching is not under serious fire by a critical public and by critical situations just is not sensitive to the situation. Let us examine the last decade in which we have begun to re-examine philosophies that are accepted as valid. Unfortunately, fear rather than faith and dedication to truth may be back of the present re-evaluation of what we have been doing.

In the Second World War, Hitler had held to the idea that if you accepted a shibboleth and repeated it often enough and loudly enough it would eventually be accepted as truth. He was proved to be wrong. During our fourth decade and the first half of the fifth, our educators had been told that science was the key to the solution of all of our troubles. If an educator merely called something science, or scientific, this seemed to be all that was necessary for its acceptance and for the advancement of the educator. There had to come a reckoning, and our fifth decade might be called the decade of reckoning. The hot war started by Hitler and his associates was over but the inflation started by our government was not. The cold war started by Russian activity imposed a new threat, and the atomic situation magnified that threat so that the inflation spiral was accelerated and magnified. The easy years of freedom from discipline represented by the progressive education movement in part vanished with this new threat, and people began to look under the rug to see what had been hidden there. Some of the very persons who had backed or even created our phony science were the loudest in pointing out the new danger to which they had contributed, but the responsibility for which they, of course made no acknowledgment. Almost everyone seemed to think that the only solution was through spending money and money became available in unprecedented amounts. One school that had had a subsidy for 25 years for a conservative program that gave doctorate training to half a hundred graduate students, had in one summer about twice as much available to give six weeks' training to individuals who were not necessarily candidates for advanced degrees. This situation was made possible by grants supplied by the National Science Foundation with the approval of the National Research Council, and by grants from private industrial concerns possibly influenced by income tax situations.

In droves, our school folk were deserting the progressive education philosophy and returning to emphasis

on intellectual discipline and the teaching of the basic skills. They sought the mastery of information that would help us as individuals and as a nation to meet the practical threats of world turmoil, of the technology of the Atomic Age and of a decaying intellectual and practical integrity so tied up in legal red tape, in public indifference and in governmental gobbledygook that real growth and advancement were completely stymied. It is this situation that the first half-century of the American Nature Study Society hands over without too much pride to the leaders of the next half-century. This responsibility should be recognized as an opportunity rather than as a limitation.

Back in 1749 when, as reported earlier, Benjamin Franklin said of nature study "This Study, if it is to be called a Study" he implied that study might be unpopular and discouraging. There are those in nature study circles today who have toyed seriously with the idea of changing the name so that study is not a part of it. There are at least two fallacies in this proposition. In the first place, study is necessary if we are to meet the demands of the present and of the future. In the second place, study is not necessarily unpleasant. Teachers who may think it necessary to try to eliminate what lazy students think is unpleasant should give at least double the effort to demonstrate that serious study may not only be consumingly pleasant but phenomenally rewarding in every way. In fact, it seems to some that there are few things in life more rewarding, personally and practically, than the habit of enjoying study. I hope that the word never vanishes from the title of the American Nature Study Society. Someone has defined an educated person as one who has learned how to enjoy doing what has to be done. Certainly we cannot face the future without study, and education should show us how to enjoy doing what necessity demands we do. This does not imply, of course, that everyone should be trained to enjoy the mastery of every field of human knowledge and experience. But everyone should learn to enjoy developing stature in some worthwhile field of personal interest and of social value. Those who do this should be rewarded. Those who do not should not find it easy to shirk their responsibilities.

The presidents of the American Nature Study Society during the past decade were as follows: Edwin Way Teale, the nature writer, 1948; Richard W. Westwood, president of the American Nature Association and editor of *Nature Magazine*, 1949-50; Ellsworth Jaeger of the Buffalo Museum, 1951; Roger Tory Peterson, the nature artist, 1952-53; Ruth Hopson, of Oregon, 1954; Malvina Trussell of Florida State University, 1955-56; and Richard Weaver of the University of Michigan, 1957.

During this decade there has been a pronounced increase in interest in conservation, which is really an implemented nature study. With the assistance of funds from the American Nature Association and the cooperation of The National Association of Biology Teachers, many of the Society's leaders figured prominently in the preparation of *The Conservation Handbook*, published in 1955. Numbers of workshops in the conservation field

were established at the end of the decade. This may be one evidence of a growing recognition of the need and value of studying one's environment to survive and to be happy.

In almost complete disregard of what nature study is, as defined by the published work of the American Nature Study Society, and as developed at the meetings through most of a half-century, the 46th Yearbook of the National Society for the Study of Education says that nature study is characterized by "the opposite of natural history, namely the practically exclusive use of exotic materials; by anthropomorphism, chiefly through nature fables; by teleology; and by moral and religious interpretations of biological phenomena." One is tempted to defy the author of this statement to show where the Society has supported any such definition. Certainly a fight between a Jurassic and a Cretaceous dinosaur, presented as elementary science by opponents of nature study would not be defended by the nature study group.

Within six months representatives of the same agency that gave us this fantastic charge published a report on an elementary science television program in which children studied a bean seed by being shown, on television cards, the story that "In the heart of a seed buried deep so deep a dear little plant lay fast asleep." The "dear little plant" in a bean seed is buried by the thinnest of integuments, as anyone with a smattering of biology should know, and I have yet to hear such anthropomorphism defended by a contemporary leader of the American Nature Study Society. Unfortunately there is too much of this sort of stuff in "elementary science" textbooks written by critics of nature study. The writer has complete faith that any honest, adequately trained scientist who will take the time to investigate will support this statement. Scientists and school administrators are respectfully requested to make such a comparison between the best-seller elementary science texts of the past fifteen years and the nature study advocated at the meetings of the American Nature Study Society and sponsored by its leaders. The writer believes that there should be little if any difference between good nature study and good elementary science.

At least in recent years the meetings of The American Nature Study Society have almost invariably presented symposia by the best leadership available on the use of modern media of education. Television, photography, writing, sound-recording, workshops, urban and suburban conservation, radio, exploration, camping, and survival education have all been presented and will continue to be developed under sponsorship of the Society and within the traditions of the organization, in the light of modern thought, and with the use of modern devices. Field trips have featured these annual meetings and if there has been anything exotic featured on these trips the writer has yet to see it. Such material is as rare on an American Nature Study Society annual field trip as are the critics of what nature study is. If you want teleology, anthropomorphism, fables and moral interpretations of biological phenomena you should stay away. If you like natural history in a natural environment you will get it.

## What of the Future?

**S**EMANTICS should not dominate the future of the American Nature Study Society any more than it should be able to destroy its past. Challenge, opportunity and promise may well be the watchwords if such devices are needed.

We need not here reiterate the valid criticisms that have been directed recently toward the failures of pre-college science and the shortcomings of the undisciplined progressive education philosophy. World crises and their concomitant fears provide ample stimuli for an action program to help man to understand and manage his environment for his own survival and for the survival of the race. Basically this calls for a sound sensory appreciation of the environment by a substantial proportion of the public as a first step. It calls for experience in the intellectual interpretation of what the senses have reported and intellectual integrity to insist on the validity of major premises. It calls for the stimulation of intellectual curiosity as well as the use of controlled imagination.

This can guide prognostications efficiently into fruitful channels of investigation. More than any of these, it must establish habits of behavior that will use our material resources intelligently. It will also rally our intellectual powers and our financial and strategic influences to get things done for the good of man and of society today and tomorrow. Technology may free some from the necessity of effort to make a living through much of their lives. To guarantee survival in a competitive world we must learn to capitalize on the experience and resources of those who have the ability, the resources and the leisure to advance the welfare of mankind. This is quite obviously one of our major current challenges.

Never before in the memory of the present generation has there been a time when financial subsidy for worthwhile work was more generally available from government and private sources. Never has there been a greater need for a revival of a recognition of the merit of discipline and the rewards that may be expected from its wise use. Never before has the teaching profession been faced with such a period of expansion in which the developing generation may be significantly influenced. Never before has there been available a greater resource of inventive genius for making this a better world and a greater promise for a rewarding future for those who develop such genius as they have. Never before has the world faced a head-on conflict between two ideologies of government and possibly at least two ideologies of education. We must measure up to this opportunity that is being presented to us.

Only uninformed, dishonest or blind folk can read into the record of The American Nature Study Society what its detractors have said of it. Few if any can deny that had the teachings of the Society been followed more closely we would not now be facing crises that have arisen from the adoption of other philosophies. Only a blind person can fail to see a bright future as a possibility if we use wisely what we know. ❀ ❀ ❀

# Stalled but Not Stopped

**V**OTING seven to six against a favorable report on legislation to control outdoor advertising along the 41,000 miles of the multi-billion-dollar system of Interstate Highways, the Senate Committee on Public Works stalled, for the time being, the prospect of safe and pleasurable travel over these highways.

Voting for safety and pleasure of travel were Senators Carroll, (Colorado); Case, (South Dakota); Chavez, (New Mexico); Cotton, (New Hampshire); Gore, (Tennessee); Neuberger, (Oregon).

Voting for the outdoor advertising interests were Senators Kerr, (Oklahoma); Kuchel, (California); McNamara, (Michigan); Hruska, (Nebraska); Martin, (Pennsylvania); Scott, (North Carolina); Revercomb, (West Virginia).

Keynote of the extended hearings before the Subcommittee on Roads on S.963, introduced by Senator Neuberger, and on Administration proposals, was a statement by Secretary of Commerce Weeks, who said: "We have concluded that advertising along the Interstate System should be controlled if the objective of the Federal Government to provide a system making for safe and relaxed driving and pleasing appearance is to be realized. We have also concluded that Federal legislation is required if such control is to be effective."

Hearings were held March 18 to 21, March 26 and 27, and April 2, 1957. The 396-page report of these hearings constitutes the most significant document on the relation of roadside outdoor advertising to the public interest ever to be published. It includes the testimony of special interests seeking to maintain or to acquire special privileges. It presents the opposing views of public interest organizations, conservation groups, garden clubs, women's clubs, roadside councils and others. It is specially important for the testimony of experts, such as Bertram D. Tallamy, Federal Highway Administrator.

Following the hearings, the issue baked in the committee oven, a hot potato that finally appeared on the committee table. Then seven members found it too hot to swallow. We are reliably informed that the final vote of at least some of the opponents of favorable action was swayed by consideration of the effect of advertising control on highway business. This is a tribute to the persuasiveness of former Senator Scott Lucas of Illinois, who represented the Roadside Business Association.

That this consideration should have had so much weight, in light of the facts, is surprising. Certainly members accepting the claims of roadside business could not have read the testimony of Mr. Tallamy on April 2, which testimony only six members of the whole Committee were on hand to hear.

In his presentation to the Committee, Mr. Lucas drew a dire picture of what advertising restriction would do to

roadside business and to those involved in providing food, fuel and habitation. In so doing he chose to ignore various facts, prominent among them the fact that 75 percent of the mileage of the new system will be through entirely new territory where no business now exists. He ignored the fact that these highways will be limited-access highways with no access to business enterprises from or to the highways, except at points of interchange, and on feeder routes. Mr. Lucas pled for the right to festoon the new highways with a multiplicity of unregulated signs, competing with one another to the confusion of the highway traveler and at the expense of the advertisers.

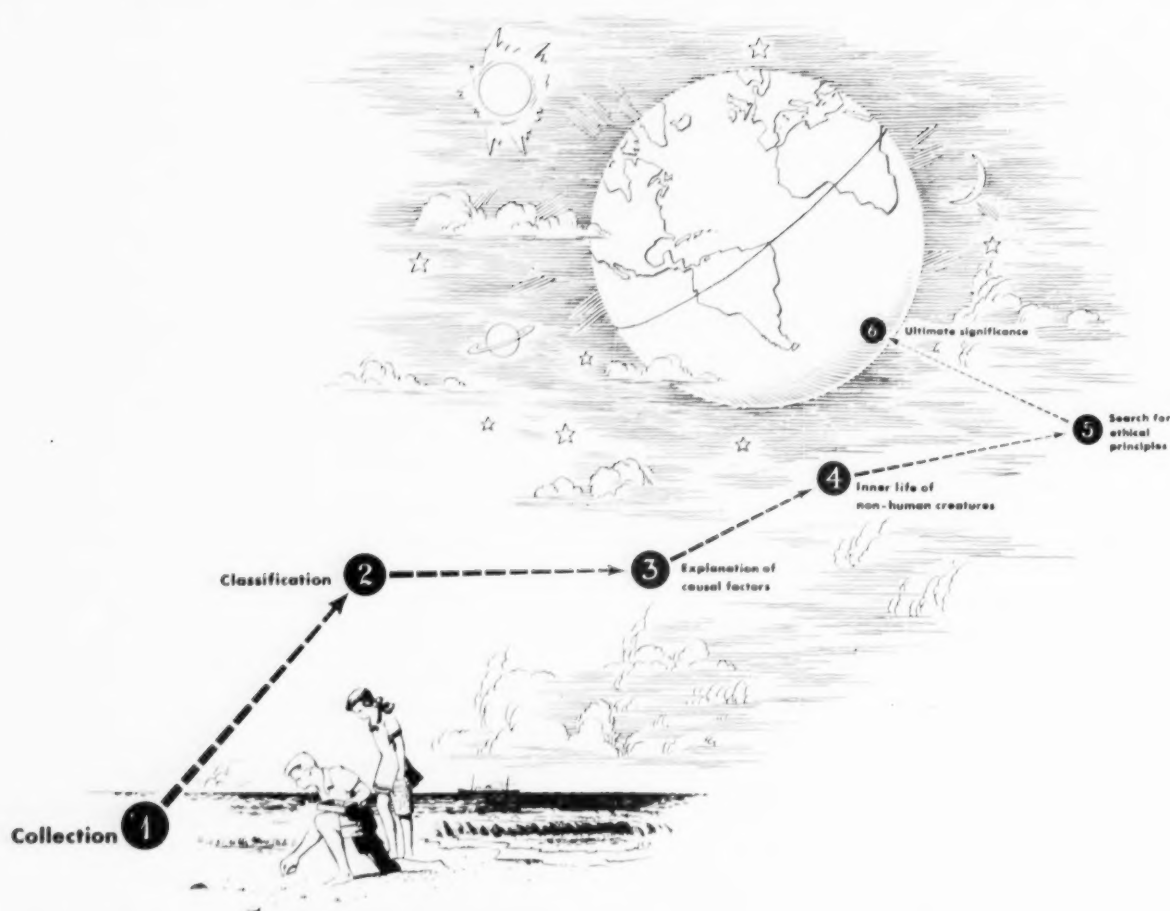
From his own rich experience with the New York Thruway, Mr. Tallamy testified there had been no complaint of loss of business from lack of advertising on that route. There had been, he said, loss of business due to the diversion of traffic to the Thruway, but that there was a period of adjustment, following which business was better than it had been before. Mr. Tallamy presented facts and pictures to show the effective use of official signs conforming to set standards of size, color and carefully selected information that indicate to the motorist where food, fuel and habitation are available. Such treatment would be equally applicable to the new high-speed Interstate Highways.

"Today," we said in our own testimony, "a large percentage of highway travelers use motel accommodations approved by the three As, or patronize Quality Courts, Superior Courts, Best Westerns, or similar accommodations that live up to high standards of service. For all the varied slogans, gasoline is gasoline, and the highway traveler is going to stop when he is hungry. What benefit is there when Joe's Motel puts up 10 signs, Mike's Filling Station 15, and Molly's Waffle Shop 20, and so on the confusion of the traveler and the damnation of the roadside?"

Today the travel habits of the public, armed with accommodation guides, modern maps with a lot more information than just the routes, and other printed advertising matter, make weakest of all the argument that roadside business (which is not on the roadside anyway) will suffer. Yet this consideration seems to have been accepted at its face value, rather than its actual value, by some Senators.

We trust that the seven named above will have an opportunity to cogitate and to observe the highway situation before the next session of the Congress convenes. At that time they should have an opportunity to reconsider. In any event, the issue is not dead. Senators Gore and Neuberger have said that it will be very much alive next January. Indeed, it must come alive if we are not to lose more of the mileage of the expensive system we are all paying for. We have already lost some through delay.





Many a career in the natural sciences has had its inception in the human tendency to pick up and save unusual or colorful objects like pebbles, feathers, flowers or shells.

## The Naturalist's Progress

By ALEXANDER F. SKUTCH

*Illustrations by Garnet W. Jex*

**P**ROBABLY the majority of those who take more than a casual interest in Nature began their careers as collectors. Delighted by the beautiful or strange objects on which their eyes fell as they wandered through woodland and meadow, they wished to clutch and retain them. A glittering pebble, a colorful moulted feather, a brilliant flower, or a curious shell has started many a boy and girl along the naturalist's long road. The desire to possess shining objects is not peculiar to mankind, but a number of birds, especially in the crow family, display it in high degree.

At this earliest stage of collecting, among crows, jays,

children and even many adults, little attention is paid to the wholeness of the specimen. It is not as an example of a certain class of natural productions but as a brilliant or curious trinket that the attractive object is acquired. In the forested parts of tropical America, one often sees the bright yellow breast of a toucan, or its huge and curiously colored bill, cut from the bird and stuck up as an ornament on the wall of a cabin. The first skins of birds of paradise to reach Europe were prepared without legs by the natives of New Guinea, who evidently thought that the whole value of the specimen lay in the gorgeous plumage, from whose beauty the quite com-



monplace legs and feet only detracted. This naive approach to the study of Nature is responsible for the name that Linnaeus gave to one of these mutilated specimens of brilliant plumaged birds, *Paradisaea apoda*, "the footless bird of paradise." Similarly, when children and amateurs collect flowering herbs they preserve only the blossoms, with perhaps a bit of stem and a few leaves, neglecting the roots, which add nothing to the beauty of their specimens, although they tell much about the character of the plant.

With those who become earnest naturalists, this sort of collecting is a transient phase, leading to a more mature interest in natural objects as wholes, all of whose parts are significant. If collecting is long and strenuously pursued, so many specimens accumulate that some system for arranging them becomes imperative. This brings us to the second stage in the naturalist's progress, the effort to classify the productions of Nature. But to do this intelligently, one must pay attention to the structure of the objects to be classified; the more detailed and intimate our knowledge of their structure, the sounder our system of classification will become. It is also helpful to trace the development of the animals or plants in question, for often a study of their earlier stages reveals relationships that are masked when they become mature. The investigation of the mode of functioning of the organism, its chemical constitution, and its behavior also contributes greatly to understanding its relationship. Thus anatomy, histology, embryology, physiology, biochemistry and ethology are pressed into the service of taxonomy, or the science of classification. Many researches in these fields have been instigated by the desire to improve or substantiate a scheme of classification.

As the naturalist continues his long journey through the vast and infinitely varied realm of Nature, he becomes increasingly curious about the reasons for the endless array of forms and colors that it presents to him. No longer content with admiring, possessing or even classifying the productions of Nature, he wishes to account for them. This brings him to the third stage in his progress, the search for explanations in terms of causal factors or of utility.

Every child and savage can see that the toucan's bill is extraordinarily large and brilliantly colored, but what is its significance? How does this bird of the tropical forest happen to have a beak so much bigger and more conspicuous than that of its neighbors of whatever size? How does it help him fill his vital

needs—or is it actually a hindrance to the bird, an evolutionary freak that natural selection somehow failed to eliminate? And by what course, in response to what needs, and by the action of what agents of selection, did the birds of paradise acquire their gorgeous plumage?

From asking these questions in respect to some of the more striking of the structures and colors of organisms, we proceed to ask about those that are less obtrusive. We wish to know, perchance, what is the function of a little hook on the tip of a small bird's bill, or of certain curious outgrowths on the legs of a bee, or why a certain moth's wings are mottled with shades of gray rather than being as brilliant as the wings of some other moths. The attempt to answer a few of these multi-



An amateur collector is likely to retain only the parts of a specimen that please him best, with little thought for the whole. Thus, natives of tropical America often cut the bright yellow breast or huge bill from the toucan, while the first skins of the bird of paradise to reach Europe from New Guinea arrived without legs or feet, which the natives thought detracted from the beauty of the specimen.

tudinous questions may occupy us agreeably for many years and exercise our intelligence to its limit.

In forming his collection, or in trying to answer some of the questions that occur to him, the naturalist commonly treats living things as though they had no will or purpose of their own, and often he deals with them as though they were wholly devoid of sentience. But occasionally a more sensitive and thoughtful naturalist stops to wonder about the inner life of the creatures he studies. How do *they* look upon the world? What feelings and thoughts might they have? Do they observe us while we watch them? He may be led to such questionings at an early age by a sort of natural sympathy, or he may be more tardily brought to them by some of the investigations he has been pursuing.

Thus the most probable explanation of the origin of the bright colors and ornamental plumes of birds of paradise and many other beautiful animals of diverse orders is that they were acquired by the process known as sexual selection. If the females of any species mated with slightly more brilliant males in preference to duller ones, this would lead in the course of generations to ever greater beauty and grace. But this explanation makes certain assumptions about the psychic life of

the animals in question, for it attributes to them esthetic appreciation, or something very like it, and thereby introduces us to that vast, unexplored realm, the inner life of non-human creatures. The effort to enter this realm, whether by the bold exercise of imaginative sympathy or by groping analysis, constitutes the fourth stage in the naturalist's progress.

When we have come to suspect that non-human animals may have feelings and thoughts, volitions and purposes of their own, we have reached by the long, circuitous path of the naturalist, who began his career by regarding them merely as potential specimens, the attitude of every untutored child and primitive man, who never doubts that birds and beasts, and perhaps even trees and shrubs, enjoy an inner life not greatly different from his own. And when he reflects that his acts may affect their happiness, bringing them pleasure or pain, joy or sorrow, the morally mature man begins to ask how he must govern his dealings with them. How should he conduct his life in order to bring the minimum of pain, or the maximum of happiness, to these other sentient lives which encompass him? He desires ethical guidance, a code of morals that will direct his dealings, not merely with other members of his own society or of his own species, but with all those beings which may be somehow benefitted or harmed by his deeds.

Obviously, moral problems, complicated enough even within the narrow context of human society, become vastly more difficult to solve when extended to cover the whole living community. Nevertheless, no thoughtful and compassionate person can contemplate man's relations with the rest of the living world without desiring their improvement, and perhaps detecting a number of ways in which this might be effected. This desire to be moral in our dealings with all living creatures, this searching for ethical principles to govern our treatment of them, marks the fifth stage in the naturalist's progress; it follows directly and almost inevitably from the fourth stage, in which the naturalist begins to wonder about the quality of consciousness in the animals he observes. Certain other cultures reached this point millenia ago, and by a route very different from that which we have traced; but Western civilization, with its own peculiar background, seems most likely to attain it by the roundabout course of the naturalist.

Of the many who take the first steps along the naturalist's long road, only a few persevere until they come to the fifth stage, and even fewer reach the sixth, which we enter when we ask: "What is the significance to me

of this so varied world in which I find myself?" This, of course, is the supreme question that religion and philosophy have long striven to answer, each in its own manner, and hence it cannot be regarded as one peculiar to the naturalist.

But it seems to acquire a vaster breadth and depth when one reaches it along the route of the naturalist, who was first attracted by the beauty and strangeness of Nature's productions, who laboriously collected and tried to classify them, who endeavored to explain the function and mode of origin of some of them, who began to speculate on the inner life of the creatures that display such infinite variety of forms and colors, who thence became concerned about his treatment of them as affecting their own welfare. Far more than the philosopher, whose life has been passed in academic cloisters, far more than the mystic, who has striven to reach the Godhead by averting his gaze from the external world and sinking into the inmost depths of his own being, the student of Nature is aware of the endless diversity of creation, of the intricate interactions among its myriad forms, of the startling contrasts between supreme beauty and unspeakable ugliness, between tender love and violent rage, between beneficent growth and destructive fury, which this baffling world presents.

He wishes to know for what purpose, if any, he has been thrust into its midst, what ultimate significance is to be found in his presence here, to what end the whole vast and confusing pageant is moving. This last question seems to include in its wide scope many of the earlier questions, so that if we could answer it with clarity, we also might know the answers to them. If, for example, one knew the significance of his own existence, he could better understand its meaning for other creatures.

These final questions, of course, lead us far beyond the "scientific" study of Nature. We often forget that science is the deliberate attempt to solve certain limited problems by limited means. The scientist investigates the phenomena manifest to his five external senses, and he has decided to employ in his researches only the data that these five senses yield to him. In the attempt to understand the relationships between these phenomena, this has proved to be an efficient method; and the scientist's success in his self-appointed task proves the wisdom of the limitations he has imposed upon himself. Yet these same limitations have placed vast segments of reality beyond the reach of the scientific method, and no one is more poignantly aware of this than the naturalist, who follows his chosen path as far as he can.

## SECRET OF SUCCESS

*Scorn not the weed, but see her thrive,  
Who never once supposes  
The wheels of cosmos don't revolve  
Round her instead of roses.*

Georgie Starbuck Galbraith

# I Saw a Queen Bee Mate

By ROBERT E. O'BRIAN

Photograph by Ross E. Hutchins

**T**HE QUEEN bee swooped down out of the sunshine and seized the drone. There was no question, as the three of us watched; she made the mating advance. My first thought was that some larger insect had attacked the bee; possibly a dragon fly. Then I recalled that I had never heard of a dragon fly attacking a bee. The two bees clung together in plain sight, not five feet from the screen behind which we stood, fanning their wings furiously. As I watched, I thought possibly this was a raid from another hive, but other bees flew back and forth without paying the least attention.

Now it dawned on me that we were seeing the romance of a queen bee. I shouted "It's a mating." By this time the two bees, who so far as we could tell were clinging to each other "face to face," were slowly dropping toward the ground. They did not drop straight down, but slanted at possibly a forty-five degree angle. Although they turned around in their spinning ball, fairly rapidly, they slipped toward the ground so slowly we were able to follow their course without difficulty.

We rushed out of the door of the enclosed porch and down the steps, just in time to see the two land, somewhere in a tiny flower bed about two feet in diameter. We hurried over. For a moment we looked for the insects, and then I saw the queen, easily within arm's length, just as she was taking off from a leaf on one of the plants. The leaf was far down the stem; in fact, it was just above the bottom leaves of the plant. Had I been quicker, I could have seized the queen. But before I could act, she was in the air, flying in the traditional straight line toward a hole far up in the wall of the house. As she flew, we could see that she was trailing what appeared to be about a half-inch of white thread from the tip of her abdomen.

We ran rather futilely after her, and she made her entrance into the orifice without much fanfare, although we noticed that there was a slight increase in the humming inside the wall,

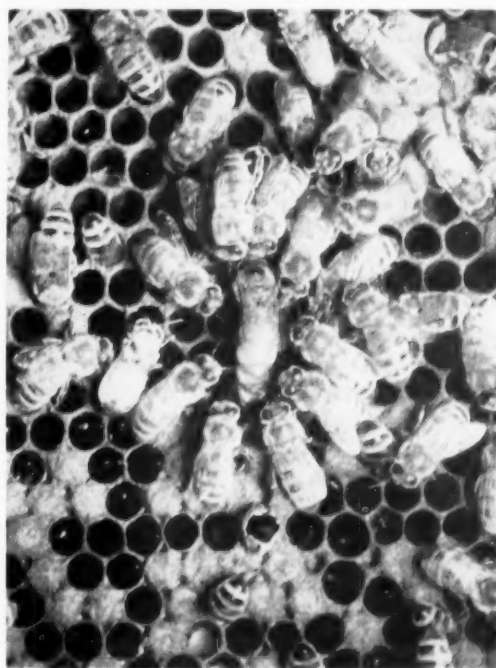
audible when we stood close. As we walked back, we checked to see if we agreed on what we had seen. All of us had seen the larger bee, the queen, grab the drone. Two of us thought she had landed on his back. It looked that way to me; and they had then turned till their legs enmeshed, and started the slow rotation with both of their wings fanning violently. This, of course, checked their fall, and their movements were so slow that we could easily distinguish the queen by her size. Only when they reached the flower bed did we lose sight of them; and, by that time, we were running down the steps. We could not tell whether they landed on the earth or on some of the plants. When we saw the queen, she was on a plant. We did not see the male or drone near her.

After we agreed that the queen had been the aggressor in the romance, we returned to the flower bed to see if we could find the male. The partner in the mating was located just below the plant from which the queen took off—it was easy to find him, on account of his buzzing.

At first glance, the drone looked hardly like a bee. Then one of my companions, who had been watching, said that the bee was trying to crawl up a stem. We looked, and when viewed from the front, he had the large head and shoulders of a drone. But when he lay on the ground, he looked like only half a bee; he had almost no abdomen.

We watched him climb the plant to the lowest leaf, and then crawl out to the edge of it, where he beat his wings, and tried to take off. We already suspected he could not fly, since he had been buzzing vainly on the ground. He managed to get off the edge of the leaf with his wings beating, and headed straight for the earth, where he hit so hard that he actually bounced back a fraction of an inch as he landed squarely on his head.

As he lay there half-stunned for a moment, we examined him as closely as possible without a lens. His wings



In the center of the illustration is a queen bee, surrounded by the maids-in-waiting who feed her and keep her clean during her continuous egg laying. The workers with their heads in the cells are feeding larval bees; capped cells contain developing worker bees who will carry on the colony's work.

did not have a single break, or visible damage of any sort. His thorax, especially the shoulders, were still glossy with fuzz. It would seem that he had emerged from his cell only a few hours earlier, or else he had led a rather indolent life; for his physical appearance was still fresh and new. The abdomen, however, resembled a crumpled accordion. Except for the rumpled outer scales, it was gone, surrendered in the encounter we had seen.

I ran into the house for a lens, and when I returned, my companions pointed out the drone, climbing painfully up another stem of a flower. He crawled out on a leaf, and as soon as he reached the edge, tried to fly; but he seemed to have lost his ability to balance in the air. Once more his head dropped, and he fell toward the earth. He buzzed until he regained his legs, and once more tried to climb a flower stem. He made it up, but his flight ended in the same head-first drop to the ground. Yet a fourth time he slowly and painfully climbed the stem. This last attempt at flight was so feeble that he let go of the stem of the leaf, and fell to earth with hardly a flutter of his wings. Plainly, he was about through.

When we picked him up he struggled feebly. We examined the crushed and contracted abdomen. From the outside, there was no apparent injury. No remnants of torn ducts or ligaments were hanging from where the anal opening might once have been. The abdomen was so contracted that it was impossible to tell whether the male testes had been removed through the anal opening, or whether after the male organs had been torn from the body the remaining ligaments had contracted the injured membranes, pulling them as tightly together as possible, giving the abdomen from the outside the badly crumpled and shrunken appearance. In fact, viewed from above, while he lay on the ground, we had assumed when we first saw him that he had no abdomen at all.

With pressure, the shrunken tissues contracted visibly even more. Certainly he had lost at least two-thirds of the contents of the abdominal cavity in the mating. Her royal highness had left him very little in the way of equipment!

After examination, we replaced the castrated male on a leaf, and he promptly tried to fly again. This time he hardly did more than flutter his wings, let go with his legs, and drop to the ground. His flying days were about over. The great weight of the head was no longer counterbalanced by the large abdomen, and the loss of vital organs was by this time sapping his vitality. He made one more effort to climb a stem, but had hardly more than started, when he slithered backward and partially "sat" on his crumpled abdomen, where he buzzed slowly, looking for all the world like a miniature delta-wing plane trying to take off from a vertical position. Clearly, the drone could not live much longer.

Finally, the emasculated drone rolled over and was still. We squatted uncomfortably to watch the end, assuming he would die; but some ants found him, and crawled about exploring the possibilities. Now and then, he would rouse up and buzz a little. We left him there, and when we returned later there remained only the head with its glaring eyes, and a few bits of odds and ends of the erstwhile drone.

We had enjoyed a splendid view of the whole romance. A swarm of bees had entered a tiny hole about ten feet above the ground, in the corner of the house where a wing had been joined some years before. The wall of the wing was less than ten feet from a screened porch, one of whose sides ran parallel to the wall of the wing. The distance between them was twelve feet, and it was between the two walls that the mating took place. I had taken one of the guests to the screened-in porch to show him where the bees had their entrance. My brother-in-law

had joined us; so, when the event occurred, we were looking toward the white wall, and the sun was illuminating the passageway plainly.

The bees had been flying lazily back and forth in the space between the wall and the porch, and when the mating occurred, it was not more than four feet from the screen where we were standing. We agreed that the queen had swooped down almost in a straight line, from high up in the air. She must have chosen her lover deliberately, for there was no hesitation on her part. We saw her land squarely on his back. The male had certainly been minding his own business when she grabbed him to confer immortality on his hereditary line.

We agreed that we had seen the seizure, and that the two had then formed a ball, clasping each other with their legs, and turning over and over as they slowly descended to the ground. In spite of the slow movement and the excellent visibility, we had no way of telling when the actual mating took place; whether in the air, on the stem of some flower or on the earth. There was no question of identifying the queen, which we saw at a distance of not more than two feet or so, as she poised on a leaf before leaving for the opening in the wall. We had no way of telling whether the pair had landed on the leaf or the ground. In the latter case, the queen had crawled to the leaf, leaving the male relatively helpless on the earth. If they had landed on the leaf, then the male had fallen off after his usefulness had ended.

There was a space of at least one full minute after we hurried down the steps and started searching for the pair in the flower bed, and the time we saw the queen as she started her flight to the hive. We had no way of knowing what happened in that minute.

Since we were aware that the (continued on page 498)

## A BEE'S DAY

*The bee comes along  
With an amber song  
In her mouth: each hour  
She spices a flower  
With honey so gold  
Until she can mold  
The summer to her way.  
It is a bee's day.*

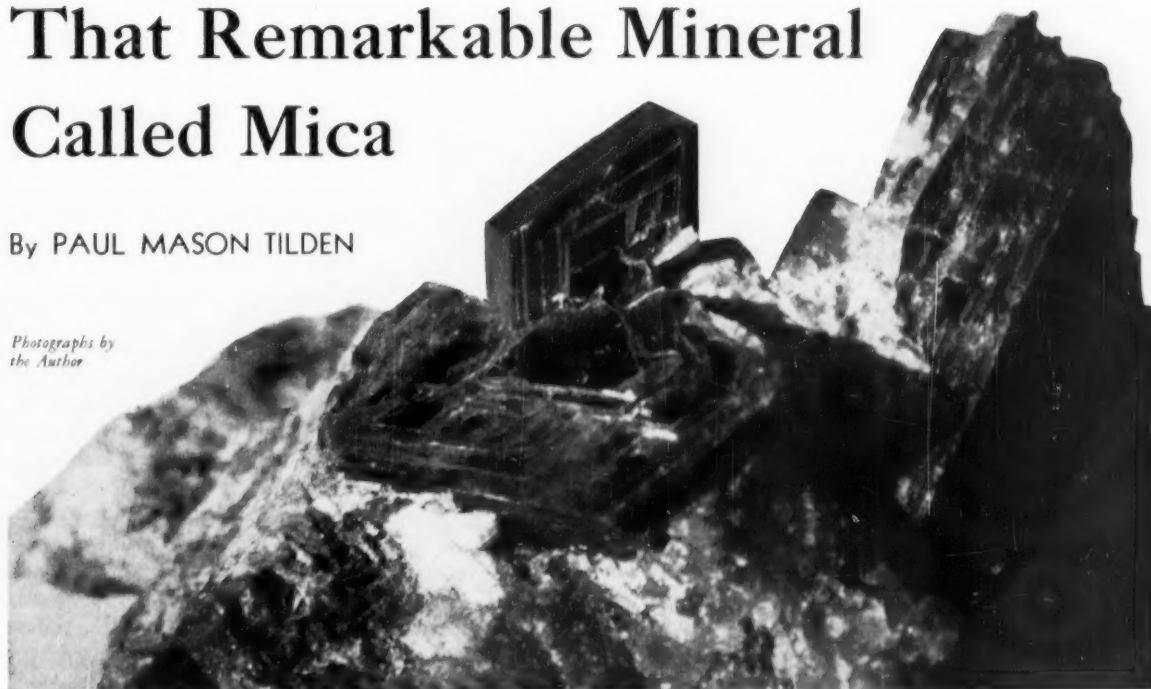
Marion Schoeberlein



# That Remarkable Mineral Called Mica

By PAUL MASON TILDEN

*Photographs by  
the Author*



Mica is one of the common rock-forming minerals; but in spite of its abundance, it is not often found in well formed crystals like this diamond-shaped specimen. It occurs ordinarily as small flakes, in both igneous and metamorphic rocks.

**F**ROM THE time you get up in the morning until the last villain perishes under the gunfire of a straight-shooting radio or television marshall in the wee hours of the morning, your pleasant routine depends on one of Nature's most versatile crystal creations—the mineral mica.

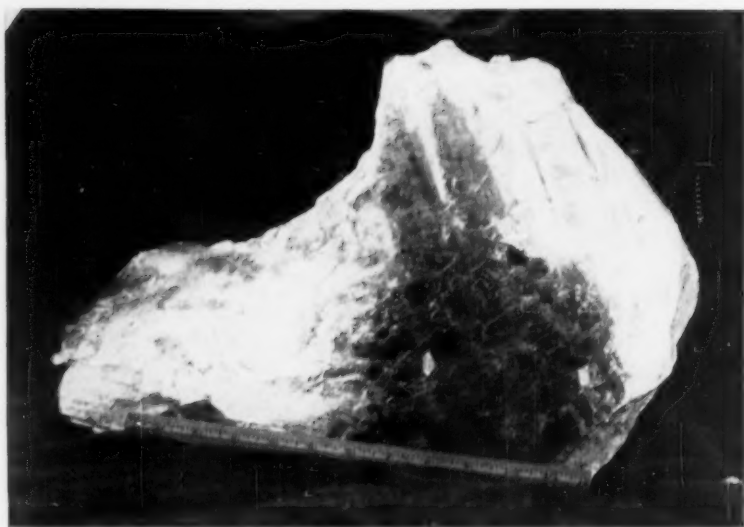
At the breakfast table, your toast is browned between red-hot wires wrapped around thin plates of mica. If you decide on a little do-it-yourself painting around the house, mica is quite likely to be in the paint you use. Your wallpaper, plastic gadgets, the tires on the family car, your radio, television, and scores of other modern conveniences all demand their quota of mica. Even the artificial snowstorms that rage at command in Hollywood studios depend on this adaptable mineral; the "snow" is usually nothing but flakes of mica. If the American economy were suddenly cut off from its supplies of mica, there would be a sudden and most unwelcome change in the daily habits of Mr. and Mrs. America—not to mention Susie and Junior!

But it was not wholly for the comfort and convenience of the American citizen that Congress, a number of years ago, included mica among the minerals earmarked for national stockpiling. It was, instead, a matter of national security. It took the second great war to jolt industry and government into realizing that modern warfare, with its multiplicity of electronic gadgets, would eat up available domestic supplies like a hungry cat wolfing canned salmon. The mines of the North American continent were simply unable to supply the

amount of mica needed to maintain American industry as the arsenal of the free world.

What is this remarkable mineral that keeps the age of electronics humming? To begin with, mica is nothing that has come into use overnight, like some of the new wonder-metals, although its uses have certainly changed a good deal down through the years. Quite the contrary. It might be speculated that sheets of shining mica were the first simple toys of the children of prehistory. At least, it is unlikely that anyone could successfully challenge the notion. Even today, the thin leaves that can be separated from "books" of mica fascinate the youngsters, who love to see how far the splitting process can be carried. And that fascination is not confined to youngsters, either. Mica miners will tell you that there is one thing they cannot leave around the mine unattended . . . and that is a sizeable sheet of mica. If there are mineral collectors around, it will disappear as though it were on a magic carpet!

There are a number of varieties of mica, just as there are number of varieties of beans you can buy to plant in the garden. And, like beans, some mica varieties are more valuable than others. The variety that finds the greatest use in modern industry is that known as muscovite, or white mica. (Actually, not much of it is white; the bulk of commercial mica, in reasonably thick books, or crystal sections, ranges from light to dark reddish-brown—called "ruby" or "rum" colored—through various shades of yellow, buff and green.) Naturally, large clear sheets, free from staining and the



Sheets of mica like this are cut and punched for use in toasters, electron tubes, and scores of articles for both war and peace, while the waste is ground up for use in roofing, ceramics, plastics, and other purposes.

is usually responsible for the formation of one of these pockets or seams called a pegmatite, it is only natural that the contents should reflect the composition of the parent rock. This it does; but the individual crystals, instead of being microscopic objects, are built in the grand manner. A mica crystal from one such "giant granite" in Ontario was 33 feet long and 14 feet across, and something like 60 tons of useable mica was trimmed from its leaves!

all-too-common inclusion of other minerals, command the best prices, sometimes as much as seventy dollars a pound.

From the point of view of the mineralogist, the several varieties of micas are aluminum silicates, in which the presence of elements like potassium, magnesium, iron, or lithium determines the specific name. Ordinary muscovite is called potash mica, because it contains a considerable percentage of the element potassium in its chemical composition. Biotite, the variety that is usually shining jet-black in the freshly broken crystal, contains, instead of potassium, a proportion of iron and magnesium, while still another variety that has been given considerable attention of late years is the lithium mica known as lepidolite, a colorful, ordinarily fine-grained mineral whose reddish-lilac or green lends sparkle to the collector's cabinet. The light metal lithium has assumed increasing importance in this age of atomic experimentation; but unfortunately, lepidolite may rightly be classed as one of the rare minerals, and few mines are devoted solely to its production.

Mica is one of the really universal minerals, like quartz. It can be seen glimmering in tiny flakes and plates in many different kinds of rocks, both those that were born from the slow accumulation of sediment beneath water, and the kind that shouldered and ate their way up into the earth's surface-cover, where they could be exposed later by Nature's processes of tearing-down and leveling-off.

But the home of the crystals that bring a living to the miner and quarryman is in the coarse-grained granite "pods" and dikes that the mineral collectors know as "pegmatites," or aggregations of extremely coarsely crystallized minerals. Since a granite intrusion

It may seem odd that while mica is so common and so widely distributed through the rocks of the earth, it is not often that a really fine crystal specimen is uncovered. It is frequently found in books with one or two crystal sides nicely developed, or sometimes even three. But lucky is the collector who can exhibit a perfectly crystallized specimen of this mineral. Ordinarily, the various micas crystallize in a tab, or book, with a regular six-sided outline across the cleavage pieces, if the book is well formed. Sometimes the book will be shaped like a diamond with its longer ends cut off sharply, showing another kind of six-sided figure. Most commonly there is no discernible crystal shape at all—the specimen has irregular sides, and resembles nothing but a lump.

One of the qualities that makes mica so valuable is described by the mineralogists and mineral-hobbyists



The presence of other minerals between the thin plates of a mica crystal is an aggravation to the miner, but a source of joy to the mineral collector, who sometimes finds intriguing crystal colonies under the magnifying lens.

A small but typical "pegmatite" is exposed in a New England highway cut. From such granite intrusions come the sheet mica so essential to modern living.



as "cleavage." Nature puts her crystal children together in such a fashion that they are split open most easily in certain directions that are constant for each mineral species. One mineral may have a good, or easy, cleavage in two different directions or planes, while another will have perhaps three. Others have none at all. Mica has but one cleavage, or direction of easiest splitting—but the one it has is nearly perfect. A well-formed book of mica can be split into sheets so thin that it would take a thousand of them to make a pile one inch high!

It is this phenomenal ability of mica to split into thin sheets, plus the fact that it is a fine dielectric, or non-conductor of electricity, that makes the mineral indispensable to the booming electronics industry. From suitable sheets of good grade mica machines punch out circles, squares, and all the other shapes that go into electron tubes, capacitors, and assorted electrical paraphernalia so mysterious to the lay mind, as well as the material for household appliances, from flatirons to water-heaters. From the lower grades of the mineral comes the so-called "scrap" and "flake" mica that is ground up for so many different jobs in the roofing,

paint, plastics, ceramic and a variety of other industries.

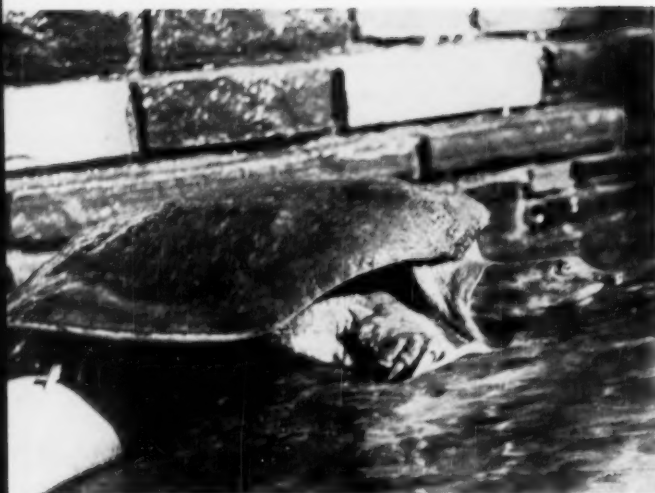
To the disgust of commercial producers, and the great delight of mineral collectors, some books of mica—especially the muscovite variety—have a strong tendency to include small crystals of other minerals within their structures. Ordinarily, the intruders lie in the remarkable cleavage plane of the mica crystal, compressed, in many cases, to almost microscopic thinness. If you have ever used a heavy book to press a leaf or a flower, you will get a notion of how these errant minerals arrange themselves; they lie between the leaves of mica like pressed flowers between the pages of a book.

The mica miner detests them; inclusions and imperfections will fetch him a lower price for his product. But the mineral collector knows that the tiny crystals are likely to attain a perfection of geometric outline that is almost unknown in the world of larger, free-growing crystals. Through a clear plate of mica, they stand out like little crystal islands in a transparent sea. There may be miniature beryls, flattened to pale ribbons, or jet-black swarming dots of magnetite, hematite or tourmaline. Now and then the tiny imps have marshalled themselves into a ghostly imitation of the six-edged crystal habit of their host, so that no matter how formless the perimeter of the sheet of mica, you can tell where the sides of the crystal *would* have been, had Nature made it perfect.

The commercial production of mica in the United States dates from about the year 1803, when the Ruggles mine in Grafton Center, New Hampshire, commenced operation. And New Hampshire continued to be the nation's only source of sheet mica until the closing years of the war between the States, when some of the other mica-rich States of the eastern (continued on page 498)



Sometimes collectors find two different kinds of mica in one specimen. The illustration at left, considerably magnified, shows the line of junction between iron-rich biotite (black) and potash-bearing muscovite (transparent).



## Emory, the Soft-Shelled Turtle

The long neck and snout of the soft-shelled turtle enables it to breathe while concealed in the soft mud of shallow water. *Trionyx emoryi*, native to Mexico and Lower California, is spreading north via the irrigation canals of the southwest.

ERNEST MULCH and I were fishing for bass in an Arizona lake one lazy afternoon, using waterdogs as bait, when without warning a sudden strike on Ernie's line brought us both into action. When the line was retrieved, only the head of the waterdog remained on the hook.

Several more casts produced the same result; a sudden strike, then a limp, dead line and the costly bait stolen. We did discover, however, the bobbing head of a turtle on the surface of the water nearby; and, as we made another cast, the head dived beneath the surface. In a flash, the newly submerged and active waterdog had served as a meal for this "free loading" soft-shelled turtle, who we later nicknamed "Emory."

The soft-shelled turtle, *Trionyx emoryi*, often is called the flapjack, because the leathery shell somewhat resembles a flapjack in appearance; and for the creature it covers, the shell offers no more protection than would a flapjack. Even the lower shell, or plastron, is soft, and will quickly bruise and tear if the turtle moves about on the rough desert sand, or travels through rocky canyons.

The soft-shelled turtle is now making use of the vast network of irrigation canals and man-made lakes of the Southwest as a means of safe, easy and dependable transportation in its migration northward, and the species is being found more often around Phoenix, Arizona, as it continues to extend its range from Old Mexico and Lower California.

We have long accepted these canals as arteries that provide us with even more than the irrigation water needed for parched and nearly rainless desert acres; and man has learned to produce green pastures, citrus groves and cotton fields, where once greasewood and cactus grew. These same canals provide sport and employment, also, for many people.

They provide a means, too, of spreading species of unwanted grasses, as the seed floats through them to be deposited on field or city lawn. They are the avenues of escape for many species of fish that leave the deep

lakes by way of dam, diversion box and head-gate, to die on lawns and fields. In the same way, the soft-shelled turtles are spreading northward through the canals, as their physical makeup is so well suited to an aquatic way of life that they accept the fresh water canal systems as they would a more natural habitat.

They may be seen immersed in the mud of shallow water along the Salt River, with head protruding above

Mrs. Emory spent the afternoon stealing bait from the two fishermen; but she was finally taken, along with a prize bass.

PHOTOGRAPH BY RALPH A. FISHER, SR.

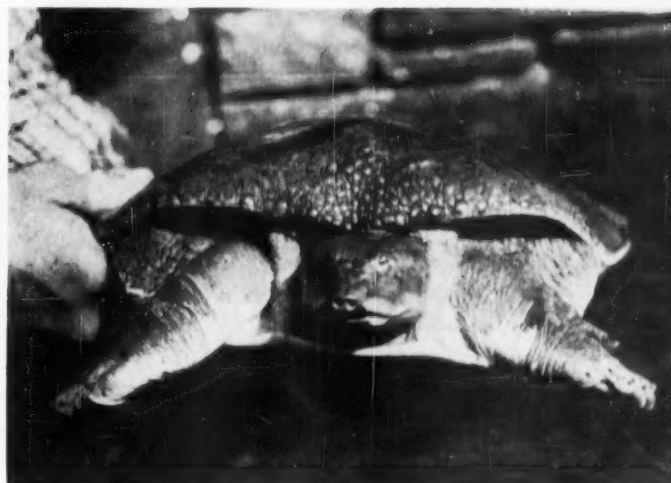




By RALPH A. FISHER, SR.

*Photographs by Ernest Mulch unless otherwise credited*

Unlike most turtles, the soft-shell lives in a flexible, leathery "home" that resembles a pancake or flapjack. Beneath the soft lip are sharp jaws that make the soft-shelled turtle capable of inflicting painful bites.



the surface, as they must breathe every few minutes while they discharge waste and carbon dioxide into the water. The extra long neck acts as a breathing tube for the turtle, bedded in the soft muck of a shallow river or a man-made canal.

While the protective soft-shelled defense is not particularly effective either above or below, this fellow conceals an extra sharp mandible beneath soft lips.

Soft-shelled turtles thrive in captivity, and one specimen became a feature attraction in a wildlife exhibit of the Arizona Game and Fish Department.



With a long neck that can flash from between the two soft shells like an arrow loosed from a forty-pound bow, Emory's turtle can be a formidable antagonist, often able to inflict painful wounds with well-aimed bites. And along with the ripping bites, it is capable of dealing out scratches by slashing with sharp claws.

A full-grown soft-shelled turtle of this species may attain a length of from fifteen to eighteen inches, and a weight of somewhat less than forty pounds. Such turtles are hard to catch, as well as being a source of danger to the inexperienced; but once caught, they will, with the proper care, thrive in captivity.

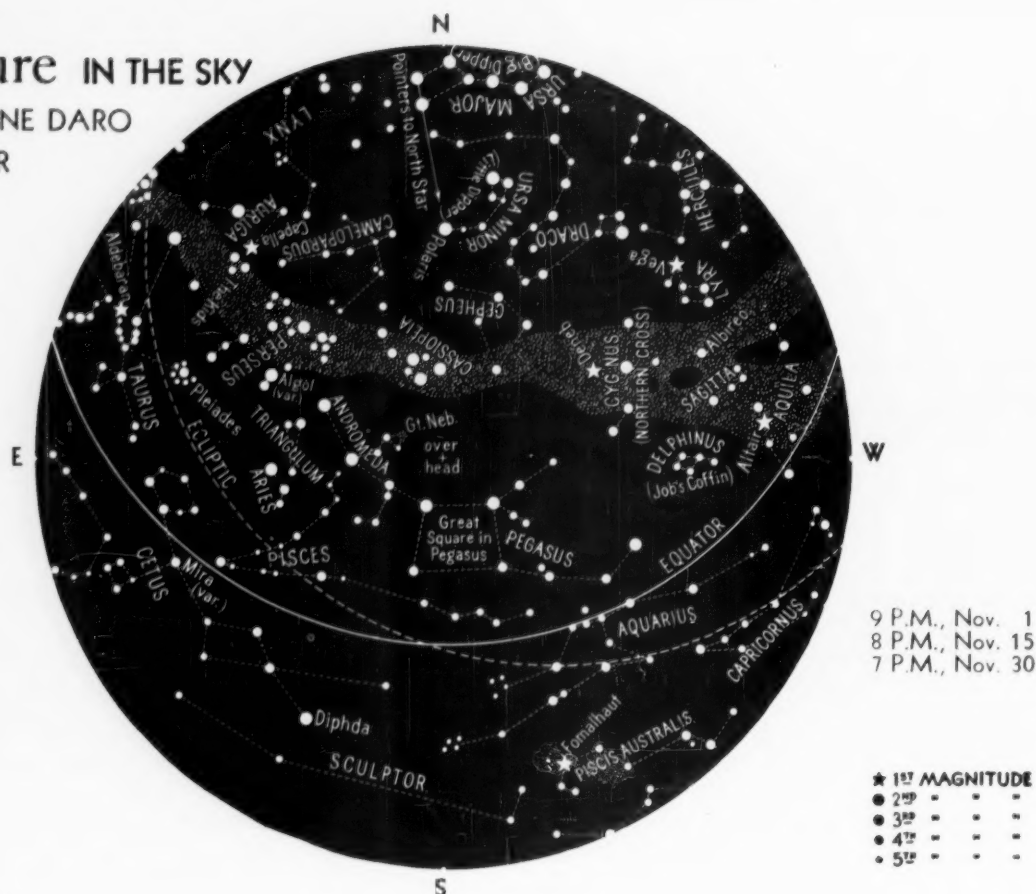
During egg-laying, the female seeks out a spot along a river bank, above the high-water mark, digs out a hole and buries herself, except for her protruding snout-like head. She remains buried until she has deposited several dozen hard-shelled eggs. After this chore is completed, the female departs the nest, crawls back to the water, slides in, and is soon feasting again on fish, frogs, mollusks or perhaps a wandering waterdog. Sometimes, again, an unprotected fledgling like a mallard duckling may become a meal for a soft-shelled turtle. In turn, the turtle may become a meal for a human; for the meat of the "flapjack" is edible, and is often found for sale in the markets.

In the warm sun of the Southwest, the soft-shells like to crawl up on a warm rock or log along a river bank, and sometimes may be seen basking in the sun atop a floating clump of Johnson grass as it slowly moves along the waters of a canal. Or they may rest on the bank, with heads pointed toward the slow-flowing water, and as you step close to the bank above with your warning shadow, they slide quickly into the haven of the cool water.

The capture of Emory, our eight-pound soft-shelled turtle, in the shallow Salt River near Blue Point, was something of a struggle. We soon discovered that the soft shell was quite pliable, offering no chance for a firm grip; and the slashing claws could move fast and accurately. Only after my friend (continued on page 500)

# Nature IN THE SKY

By SIMONE DARO  
GOSSNER



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then, below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. Times given are for Local Standard Time.

## Astronomy Bookshelf

**Y**OU NEED NOT be a scientist to enjoy the beauty of the skies, nor to partake from the knowledge that has been derived from their study. Much of this knowledge may be explained in non-technical terms. In the last few decades, many astronomers have published excellent books in this vein.

As a matter of fact, the wealth of popular and semi-technical books on astronomical subjects is such that it is not easy to make a choice, let alone read them all. Whether you want to read for enjoyment alone, or are seeking information on a specific subject, I hope that you will be helped in some way by the titles I have gathered for you. The list is influenced of course by limitations of space, and, unavoidably, by my own tastes and preferences. It does not purport to be comprehensive. Many of these books have enjoyed large printings, and should be available at your local public

library to furnish you with answers and entertainment.

For those who want to acquaint themselves with the constellations and the more familiar objects visible in the sky, the volume entitled *Stars* in the series of Golden Nature Guides (Simon and Schuster) is a handy and attractive little book, small enough to be carried in the pocket on a field trip. Another small volume, J. G. Porter's *The Night Sky* (Winchester, London), although less abundantly illustrated, is written with such enthusiasm and literary skill that it should delight readers in any age group. For a more detailed study of constellations and other relevant subjects, I like W. T. Olcott's *Field Book of the Skies* (Putnam). The latest edition of this classic underwent an extensive revision by R. N. Mayall and M. W. Mayall. I recommend it particularly as a source book for teachers and scout leaders, as well as the serious amateur astronomer.

The Mayalls also have published *Skysighting: Hunting the Stars with Your Camera* (Ronald Press), with easy-to-follow instructions for those who like to try their hands at stellar photography with an ordinary camera. If you get involved in this, you may want a good sky atlas. A. P. Norton's *Star Atlas* (Gall and Inglis, London) is inexpensive and widely used by amateurs and professionals. Each map is accompanied by a list of nebulae and clusters visible through small telescopes, together with other pertinent details.

For the do-it-yourself crowd, there is of course A. G. Ingalls' *Amateur Telescope Making* in three volumes (Scientific American Pub. Co.), the most comprehensive and authoritative work on the subject. Telescope making is man's work, strenuous and time-consuming, but, they tell me, an absorbing hobby. Before you take it up, however, I suggest that you discuss your plans with the lady of the house, who should not be expected to clean up after you. If you still are interested, you also might look up A. J. Thompson's *Making Your Own Telescope* (Sky Publishing Corp.), a shorter and simpler approach to the same question.

If, on the other hand, you would rather read about existing telescopes, Helen Wright's *Palomar* (Macmillan) is an agreeable account of the history of the 200-inch instrument, and H. C. King's *The History of the Telescope* (Sky Publishing Corp.) is an engrossing survey of the development of the telescope from its origin to the present.

Just looking at the sky and learning to recognize its principal features is only a first step. Throughout the centuries, man has gradually learned to interpret what he saw, and to unravel the structure of the universe. A good popular approach to the whole subject of astronomy is to be found in R. H. Baker's *Introduction to Astronomy* (Van Nostrand). Professor Baker, who is also the author of a standard textbook in use in most colleges, is noted for the clarity of his writing and the care with which he frequently brings up to date the successive editions of his books.

Excellent reference material, in a semi-popular treatment, has been gathered in the series of Harvard Books on Astronomy (Harvard University Press) by various members of the staff of Harvard College Observatory. Each of the eight books in this series has been devoted to a specific topic. Although some of the chapters may be too technical for comfort, they have been written in such a way that any part may be skipped by the reader without impairing his understanding of the rest. The most enjoyable books in this series are Harlow Shapley's *Galaxies*, B. J. Bok and P. F. Bok's *The Milky Way*, F. L. Whipple's *Earth, Moon and Planets* and F. G. Watson's *Between the Planets*. They are all profusely illustrated.

If you enjoy a more sophisticated approach, or, in particular, if you have already studied the physical

sciences, you might tackle the writings of Fred Hoyle and George Gamow. These works are highly speculative, bordering sometimes on the sensational, but always thought provoking. Among their books, Fred Hoyle's *The Nature of the Universe* and *Frontiers of Astronomy* and George Gamow's *One, Two, Three . . . Infinity*, *Birth and Death of the Sun* and *Biography of the Earth* are all available in paperback reprints (Mentor Books).

At the other end of the ladder, if your purpose is to awaken the interest of a child, do not fail to present him with a copy of Rose Wyler and Gerald Ames' *Golden Book of Astronomy* (Simon and Schuster). This attractive volume, originally published in 1955, is already in its

third printing, with each successive printing reviewed for accuracy by professional astronomers. For young readers, I also like A. T. White's *All About the Stars* (Random House) and C. L. Fenton and M. A. Fenton's *Worlds in the Sky* (John Day).

With the advent of the International Geophysical Year, and the spectacular developments in the field of missiles and rockets, the subject of space travel has been much in the news lately. It is, therefore, not at all surprising that a flurry of books on interplanetary exploration has recently invaded the bookstores. Much of it is bad, or indifferent, and grossly tainted with commercialism. There are, fortunately, some outstanding exceptions in this field, among which I recommend particularly Willy Ley's *The Conquest of Space and Rockets*, *Missiles and Space Travel* (Viking), R. S. Richardson's *Exploring Mars* (McGraw Hill) and, best of all, Willy Ley and Wernher von Braun's *The Exploration of Mars* (Viking). With another close approach of Mars due next year, the last two should be of particular interest in the coming months.

In the month of November, the moon will be full on November 7, and the New Moon will occur on November 21.

A total eclipse of the moon will take place on November 7. The phenomenon will not be visible at all on the east coast of the United States. The beginning of the eclipse will be visible in the central and western United States. The moon will enter the umbra at 4:43 AM, Pacific Standard Time, on the morning of November 7, and will set while the eclipse is in progress.

Except for Venus, the planets will be poorly placed for observation during November.

Mercury will be an evening star, setting approximately one hour after the sun by November 30. Its position, low in the southwestern sky, will make it hard to see, in spite of its bright magnitude -0.4.

Venus, in Ophiuchus and later in Sagittarius, will be the brightest object in the evening sky. It will reach its greatest eastern elongation on November 18, and will set about three hours after the (continued on page 495)

## THE METEOR

*A curve of fire traces the dark  
And warns us of a visitor.  
It makes an unfamiliar mark  
And then is seen no more.*

*Brighter than Jupiter or Mars,  
Not knowing what it's up against,  
It writes between the line of stars  
A telegram condensed.*

Daniel Smythe

# Nature IN THE SCHOOL

By E. LAURENCE PALMER

Professor Emeritus of Nature and Science Education, Cornell University,  
and Director of Nature Education, The American Nature Association

## Boy Scout Jamboree

THE BOY SCOUT JAMBOREE held at Valley Forge, Pennsylvania, this last summer should be of interest to schools since 35,500 boys of school age each had one and one-half hours of experience in the field, under qualified leadership, learning how foresters, soil conservationists and wildlife managers try to improve conditions generally in the open country. These 35,500 boys worked under the direction of a staff of 96 adults and 20 senior Scouts, many of whom had been working and planning for more than two years to make the event most worth while.

These Scouts saw how a stream bank could be managed, and how the water flow could be varied to improve conditions for wildlife and fishes in the streams. They saw how forest borders could be managed to provide homes for deer, skunks, foxes, pheasants, quail, wild turkeys and other creatures, and how bird houses could be constructed and hung to attract song birds and other birds of value to man. They saw exhibits of forests that were abused and of forests that were being used wisely; they saw trees of different ages and of varying value as forest products. They saw wind erosion of soil demonstrated, and saw how a whole watershed could be managed to serve different purposes to suit the needs of industry, of farmers and of other users of water. Some teachers may find it to their advantage to call upon some of these 35,500 youngsters to show others what they may have learned, and possibly to help them put into practice some of the things they may wish to do as a result of their experiences at the Jamboree.

### Best talent available

The Jamboree brought together the best talent available from the Forest Service, the Fish and Wildlife Service and the Soil Conservation Service. Working with these were

experienced workers from the State departments concerned with these matters in New York, Pennsylvania and New Jersey. A bulletin outlining the whole program was given each Scout thanks to financial support from the Outboard Boating Club of America, in cooperation with the National Wildlife Federation. A movie film built around the magic of conservation was prepared by the cooperating Federal agencies and was used as an introductory survey preceding the field experience. We like to think that we can report later on practical results of this experience, just as we did the preceding Jamboree on the West Coast.

I could give plenty of examples of things I saw that convinced me that the boys were impressed by the opportunities made available to them. One might be inclined to disparage what some call flag-waving, but I doubt if this is justified. On the opening day I sat possibly fifty yards from the Jamboree's main flag staff shortly after the flag had been raised. Everyone had moved away from the site when I saw a Scout, who must have been nearly six feet tall, move up to the flag staff, look up at the flag, look around to see that no one was watching him, stand at salute, then reach down and pick up a handful of soil from the base of the staff. He took out an envelope and put the soil in the envelope. Again he looked around to see that no one was watching him, stood at salute a second and then moved off. I have not the slightest idea who the boy was, but he wore insignia indicating he came from a Corn Belt State that I once learned to respect highly. Somehow I have a little confidence that that boy, and many others, profited from the Jamboree.

While I served as chairman of the committee responsible for the Jamboree's conservation program, I can take little credit for what was done because I never worked with a group

that gave more wholeheartedly of their time and talent for the good of all. I once called the preceding Jamboree "operation aspirin" because I expected it to be a headache. I once thought of calling this Jamboree "operation bufferin" because it was much less painful than its predecessor. Really, I think, it should have been called "operation conservation" because I believe it did help a substantial group of influential boys know how to live better with their natural surroundings.

### A.N.S.S. meeting

The fiftieth annual meeting of The American Nature Study Society will be held at the Antlers Hotel in Indianapolis, Indiana, December 27-29. It will include a joint field trip with the National Association of Biology Teachers to Bradford Woods, and will conclude with Kodachrome showings by such well-known leaders as Roger Tory Peterson, Charles Mohr and William G. Vinal. The annual banquet will be held on the evening of December 28 and we hope it will be attended by many readers of this page.

The special educational insert in the center of this issue of *Nature Magazine* gives a summary of the fifty years of activities of the American Nature Study Society and a suggestion of the conditions that led to its formation.

### Retraction and apology

The writer of this page, and of the special educational inserts, has been at times rather outspoken in his criticism of errors made by others. At this time, he wishes to correct a statement made in the latest insert dealing with snakes. The generalization was made that "our" egg-laying snakes are not poisonous, and yet the insert included consideration of the coral snake which lays eggs and is definitely poisonous. The writer was being unreasonably provincial in using the word "our" while thinking of the Northeast, where he has lived most of his life. Since the generalization that egg-laying snakes are not poisonous is dangerous and invalid, we wish to make an apology for the error and suggest that critics of generalizers should be wary about making generalizations such as the writer made. The error was called to our attention by W. A. Dayton of Arlington, Virginia, a long-time reader of *Nature Magazine*. To him go our thanks. ♪



## Bookshelf

(Continued from page 493)

sun on that date.

Mars, in Virgo and later in Libra, will be faint and poorly placed. It will rise about one and one-half hours before the sun on November 15, and will be low in the southeast at sunrise.

Jupiter, in Virgo, will be found to the northeast of Spica. It will rise nearly 3 hours before the sun. Its magnitude will be -1.2.

Saturn, in Ophiuchus, will appear in the vicinity of the sun at sunset. By the end of November it will be lost in the evening twilight.

The Taurid meteor shower is to be expected between November 1 and 10, with maximum zenith rate of six per hour. Observations will be hampered somewhat by moonlight. The Leonids will appear on November 16, with maximum zenith rate of three per hour.

### Northern Sanctuary

Canadian Resources Minister Douglas S. Harkness has announced the establishment of that country's first bird sanctuary in the far north, a 3150-square-mile area on Baffin Island in the Northwest Territories named the Dewey Soper Bird Sanctuary, in honor of the biologist who first discovered the breeding grounds of the blue goose. The protected area includes the heart of the blue and snow goose breeding grounds, as well as those of the American brant and Hutchin's goose, on the southwest side of Baffin Island between Bowman Bay and the Koukdjuak River.

### The Bergamot

Would you know a bergamot if you saw one? Not the wildflower *Monarda*, but the citrus tree. In restoring the plant life of the grounds of the "Oldest House" to its condition of the late eighteenth century, the Saint Augustine, Florida, Historical Society recently needed a bergamot, mentioned by DeBrahm in 1771 as growing in the gardens of that town. A search finally located what was thought to be the only bergamot in the country, at the United States citrus station near Orlando. The U.S. Department of Agriculture agreed to bud two trees for the Society, and the flourishing young bergamots were set out last spring. The Society is now waiting patiently to see what the fruit of the bergamot looks like.

## Conservation Directory

Now available is the 1957 edition of *The Conservation Directory*, the National Wildlife Federation's listing of the organizations and officials concerned with the protection of wildlife and other natural resources. Within the 102 pages of *The Conservation Directory* are to be found the public agencies and responsible personnel of national, State and territorial governments of the United States, those of neighboring nations in North and South America, and the non-governmental organizations within the United States that have a national or State-wide scope of interest. This is an invaluable source of information to conservation workers, public and private. The *Directory* is obtainable from the National Wildlife Federation, 232 Carroll Street N.W., Washington 12, D.C., for fifty cents.

### Educator Awards

As part of the observance of the hundredth anniversary of its founding, Shattuck School, of Faribault, Minnesota, will make awards to one hundred living persons who have made outstanding contributions toward the advancement of secondary education through public, parochial, or independent schools. Shattuck School is now seeking nominations for the awards; and many readers of *Nature Magazine* will, no doubt, wish to assure a conservation representation among the nominated hundred from the ranks of the outstanding educators, authors, editors or other workers in the conservation movement. The details of the awards are available in a folder obtainable from the Reverend Joseph M. McKee, Centennial Coordinator, Shattuck School, Faribault, Minnesota.

### Underground Organ

An electronic organ using the stalactites of the Luray, Virginia, Caverns as pipes was given its first performance this summer. The organ, largest in the world, is the brain-child of Leland W. Sprinkle, Sr., electronic scientist at the Pentagon in Washington, D. C., and required three years of research, design and experiment. This remarkable electronic instrument can be made, if such growth seems desirable, to include all tunable stalactites in the 64-acre caverns, and is said to be unique; a status which, some may hope, it will continue to enjoy in perpetuity.



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# THE Nature CAMERA

By EDNA HOFFMAN EVANS

## Vacations and Cameras

I AM A CONFIRMED vacation-trip picture-taker. So are plenty of other people, judging from the numbers of cameras I see wherever vacationers gather. More and more, however, as I look over the results of each trip's camera activity, I am convinced that really good pictures are not taken in a hurry and that one cannot successfully mix traveling and picture-taking.

Not that I am suggesting that travel-time camera activity cease—far from it. What I do think is that pictures-on-the-run are pictures-for-the-record. Occasionally, but usually quite by accident, a picture taken under such circumstances will have salon possibilities—artistic composition, perfect exposure, interest, technical excellence. But this happy combination will not occur spontaneously often, and those of us who expect super-results from every vacation-exposed roll of film are doomed to considerable disappointment.

Of course, a person who is travel-

ing at his leisure, who can linger for hours at some scenic spot, or who can devote several days to seeking out quaint nooks and crannies, can get good pictures. The same is true for travelers who can wait until rain-clouded skies turn blue again, or until shadows are just right. But few of us have time (or take the time) to travel like that. Instead, we are off in a hurry, trying to hold to a schedule that allows no time to linger along the way. In scenic country we snap what we can from ready-made viewpoints, and only wish we had the time to get far off the beaten track and find better bits of scenery.

## Wildlife pictures

As for wildlife pictures, they are quite impossible under such circumstances. Of course, one can get pictures of a few begging bears in a national park, a tame deer, a peanut-fed squirrel, or even a bird or two. But real wild bird or mammal pictures are out of the question.

The difficulty, in fact almost the

impossibility, of mixing travel and good photography was impressed on me once again in the course of last summer's vacationing. I have several dozen pictures from it, some black-and-white, but mostly color transparencies. They are interesting reminders of a pleasant trip, but only a few from the whole lot are what I would call really artistic. Not that I am apologizing for photographic shortcomings. I am simply facing what I believe to be the photographic facts.

Cuba was my vacation spot last summer. It was a place I had never before visited, and suddenly it became the place I just had to visit before the world grew a season older. So off to Cuba aboard the car ferry that sails each Tuesday, Thursday, and Saturday from Key West, Florida.

The sky was a gorgeous blue; the water was a variety of colors depending on depth; the marl jetties and newly built breakwaters were milk white. The colors were breathtaking, but from the standpoint of photography there was not much to focus on that would make a picture come to life. I had to be content with snapshots of the ship, of the customs inspectors at work on the dock, and finally a couple of shots of the crew at work on the bow, coiling the cables and stowing gear until it would be needed again when the ship docked at Havana.

There were interesting things to watch during the seven-hour trip across the Florida Straits. A couple of porpoises escorted us away from the keys, and then the flying fishes took over. Those finny fellows really pose a photographic problem, and I wonder how many photographers have ever managed to get a successful picture of them.

## Seeing flying fishes

I never see flying fishes—and I do at rather rare intervals—without marveling "How do they do it?" Gazing down at them from the high deck of the Havana-bound ferry, I thought they looked more like terns than fishes. There was no predicting when, but at intervals they would pop out of the water just ahead of the bow and go skimming off at an angle from our course. Sometimes there would be just one, sometimes six, eight, or a dozen. Once out of the water, they glided across the wave-tops, fins spread wide like airplane wings, fifty, eighty, a hundred feet



The capitol in Havana was modeled after our own in Washington.



It will not be long before the *Maine* monument will be completely overshadowed by modern skyscrapers and towering cooperative apartment houses.

or more, before they plopped back into the water again. Sometimes they flew straight as an arrow, and sometimes they "sliced" or "hooked" the way my golf drives so often do. While I knew that they stayed in flight solely as the result of initial velocity and sustaining wind, it sometimes looked as though the little flying fishes gave themselves an additional push as the long lower portions of their tails skimmed over a wave crest.

Once away from land the water changed to a deep inky blue, while orange-colored sections of floating sargasso weed provided a pleasant contrast. Once I saw a dark gray triangular fin slicing along through the water—shark, probably. I was glad for the solid deck of the ferry under my feet.

The island of Cuba was crowned by a thunderhead and draped by a rain squall, so my first view of the famous Morro Castle was against a dark gray backdrop. But there was light enough for pictures and I took them, even though I noticed that most other snapshooters had decided that it was too dark.

Next day we started down the island, via the Central Highway, and the road in many places was a leafy tunnel through avenues of trees. I was surprised, though, that there was so little in Cuba of the Spanish moss that hangs in great gray streamers from trees in Florida.

Cuba has little of this, it seems, although many of the ceiba trees support a thick growth of pineapple air plants.

#### Cuban countryside

I think the drive from Havana to Matanzas traverses the prettiest of the central Cuban countryside. But, never having seen the island before, I was reserving judgment, conserving film (needlessly), and making mental notes of pictures I might take on the way back. This, incidentally, is a photographer's worst mistake. He should take the pictures when he sees them; he may never have a second chance or see them the same way again. I will enlarge on that point later.

Cuba looks a lot like Florida. I do not know why the similarity should have surprised me, since the two are such close neighbors, geographically speaking. But it did. The vast cane fields and sugar *centrales* look like their counterparts in the Everglades. The gray brahma cattle grazing in the fields were identical to their Florida kin. Of course, the vast numbers of royal palms growing wild were different, as were the palm-thatched *bohios*, or rural homes.

The four-century old town of Trinidad is worth more time than I could give it, and it would be fun to wander at leisure through its cobblestoned streets in search of

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interesting angles and local color. It would be worthwhile, too, to explore the nearby Caribbean coast, where the water is crystal clear and the waves have undermined the rocks so that the waves break under instead of against the shore.

### Little animal life

As for the animal life Cuba has to offer the visiting photographer, it would take time to seek it out. I was surprised at how few wild creatures I did see—no turtles on the highway, no snakes, no wild mammals, and not even many birds. There was a scorpion in one motor court room, and I shared the bathroom with a tree frog in another. The lizards were brightly colored but elusive. The bird that cried so weirdly all night remained hidden although one of the court attendants told me it was long-legged and black and white (a night heron, perhaps?).

On the way back to Havana I had the usual experience of photographers who postpone pictures. There was rain, tropical downpours of it, and my mentally noted picture possibilities were just not obtainable. Even between showers other things interfered. For example, I wanted a picture of the way lines between provinces are marked in Cuba. A pair of stately royal palms, set in round cement bases on either side of the highway, serve as markers. The pair on the Havana-Matanzas line were good examples. But on the way back I found a road repair crew hard at work tearing up the paving between them. Another picture gone by the wayside.

Havana offers good possibilities for city photography. The old part of town has narrow streets and buildings reminiscent of Spain or Mexico. Old fortifications make one think of the *conquistadores*. The capitol was modeled after our own in Washington.

The new part of town, which is much larger than the old section, offers exceedingly modern architecture for the lensman who likes such pictures. Like other Latin-American capitals—Mexico City, Caracas, Rio—Havana presents a sharp contrast of the very old and the very new in architecture.

Somehow, I felt sorry for the big black eagle that is poised, with wings outstretched, atop the "Remember the *Maine*" monument. Only half a century has passed since the

*Maine* blew up, but the five decades have been crowded with world-shaking events that have greatly overshadowed that particular disaster. And it will not be long—indeed, it is happening now—before the *Maine* monument will be completely overshadowed by modern skyscrapers and towering cooperative apartment houses.

Looking over the photographic results of my trip to Cuba, I feel that I missed as many shots as I took. Also, I feel that the trip was much too hurried for artistic photography. One can always get pictures-for-the-record; but for the real "feel" of any place it takes more than a brief stay to capture that.

REMINDER: It is high time to be thinking about photographic Christmas cards, and to be making out a list of photographic gifts for the Yuletide season. ♪ ♪ ♪

### Mica

(Continued from page 489)

seaboard started to produce. While actual production started in 1803, the mineral was by no means unknown in young America up to that time. Actually, the discovery date seems to be early in the year 1781, right after the end of the American Revolution. One of George Washington's generals, the talented and inquisitive John Sullivan of New Hampshire, sent a letter to the America Philosophical Society, along with a sample of a new mineral, on February 16, 1781.

"Gentlemen," wrote the general, "I have the honor to present your Learned Society with a Fossil lately Discovered in a mountain about Seventy Miles from Portsmouth in New Hampshire.

"The mountain is exceeding large & seems to be filled with Quarries of this Natural Concrete. It has some Properties of Common Glass, and possesses others which render it in some Respects Superior. It is equally Transparent, does not waste or Consume in Fire, receives any Colour or Dye, and will not perceptibly diminish in Weight or Size by Frequent Attrition . . . Though this Fossil has not been before Discovered in America it was long Since known in other Parts of the World . . . It may be cut out in Large Stones and be Easily Separated into Thin Laminae which appear Smooth, Glossy and Transparent."

The general also noted that the new-found mineral was just right for "covering Pictures (and) making Lanthorns & Window Lights." His letter continued at length concerning this happy find of mica, using not only the words "fossil" and "natural concrete," but also "lapis specularis" and "muscovite tale" to describe it—but there is no doubt about what he meant, and he ended his letter to the Society with the conviction that "through your influence, it will receive a Place among the natural and useful Productions of America."

Major-General Sullivan had been gone from the American scene long before mica, then called "isinglass" or "Muscovy glass," was used for anything other than stove-fronts, "lanthorn," or lantern chimneys, and the like. It is most unlikely he would have imagined that one day in the future, the nation he helped create would be both the world's largest producer and consumer of his "natural concrete." American mica mines are currently producing this mineral, in all its grades, at a rate of more than a hundred and fifty thousand tons a year, with the greatest percentage coming from the mica mines of North Carolina, Connecticut, New Hampshire, Georgia, and Maine. In addition to this, and to make up the domestic deficiency in certain scarce grades, America imports several thousand tons a year from India and Brazil.

General Sullivan's "natural concrete" has, as he hoped it would, received a place among the natural and useful productions of America—and a mighty strategic place, at that. Fortunately for the modern way of life, all that glitters among our rocks is not gold—it is much more likely to be the reflection of a stray sunbeam from a flake of that remarkable mineral, mica. ♪ ♪ ♪

### Queen Bee

(Continued from page 486)

traditional mating was supposed to occur with the male pursuing the female, we excitedly recounted the incident to a group of friends gossiping on the front porch. One woman deflated our delight by remarking, "Oh, well, I suppose that's been seen a great many times before."

But a retired professor thoughtfully remarked, "Not six times since the dawn of time!" ♪ ♪ ♪



# THE Nature MARKET

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## Wilderness

(Continued from page 464)

*ginitiana* (1739).

Even before the settlement of Jamestown in 1607, a study of plant and animal life had been published in 1590 by Thomas Hariot, of the Roanoke Colony, who ventured as far north as what is now Norfolk County. Many seeds, cuttings, live and pressed plants sent from colonial Virginia stimulated curiosity and study by naturalists in Europe, including Carolus Linnaeus, "father of modern botany." Most thorough of the early botanists in the colony was John Clayton, who collected extensively in eastern Virginia, and made some expeditions into the piedmont.

But even if there were no scientific naturalists among the first settlers of 1607, they made up for it in wonder and curiosity and a desire to write home about everything they saw. They left us a remarkably full account of what wilderness Virginia was like, from lowly chigger to lordly Chesapeake. ♣ ♣ ♣

## Turtle

(Continued from page 491)

cast a fish net over the creature did we succeed in getting it into a truck, to be deposited later in the fish tank at the Papago hatchery near Phoenix.

We know now that many of the hard-shelled, ping-pong ball shaped eggs we thought had been deposited by some species of snake were, in fact, the eggs deposited by Mrs. Emory, and that the turtle we caught and named Emory is, in fact, Mrs. Emory. ♣ ♣ ♣

## Marsh Restoration

The restoration of at least a part of the natural lakes and swamplands along the Colorado River in the vicinity of Needles, California, and Topock, Arizona, former resting and wintering grounds of thousands of wild ducks and geese, is being vigorously sought by conservationists, the Fish and Wildlife Service, and the fish and game departments of California and Arizona. Most of this wildlife habitat was destroyed by the construction of the Hoover and Parker dams, and channelization of the Colorado by the Bureau of Reclamation. However, it is proposed to divert water from the Colorado into the former Powell Lake area, now known as Topock Marsh.

## Bulletins

"Wood. . . Colors and Kinds" is handbook 101 of the U.S. Department of Agriculture, published as an aid to the identification of 32 native woods in common commercial use. Description of the species is accompanied by full color illustrations of grain patterns, and there is a glossary of terms used by wood technologists. Fifty cents, from the Superintendent of Documents, Washington 25, D.C.

"Farms Are Growing Larger" is bulletin 613 of the University of Illinois Agricultural Experiment Station at Urbana, and is a summary of an investigation into the American trend toward fewer but larger farms and its present and future effect on farm earnings and efficiency. The study is by M. L. Mosher, Emeritus Professor of Farm Management of the University.

"Christmas Trees—The Tradition and the Trade" is U.S. Department of Agriculture Forest Service bulletin 94, containing 22 pages of history and facts about the Christmas tree trade and its requirements. Fifteen cents from the Superintendent of Documents, Washington 25, D.C.

"Tenth Annual Report of the Pacific Science Board—1956" is a 49-page summary of the biological and social science research work done in the vast Pacific area during that year, with a compendium of the scientists who are conducting the various studies. From the National Academy of Sciences—National Research Council, Washington 25, D.C.

"Agricultural Economics Mimeograph 121" is a 9-page list of magazines and society reports of interest to amateur and commercial flower, plant and fruit growers, as well as botanists, seedsmen and technical workers in plant life. Compiled by L. A. Dougherty, Extension Economist in Marketing, it may be obtained from the Cooperative Extension Service, University of New Hampshire, Durham, N.H.

"Zoonooz" is the excellent monthly publication of the Zoological Society of San Diego. The issue for August contains, among its interesting stories of zoo life, a high-class repertorial job on the opening of the new Children's Zoo, by its "zooperintendent," Joan Morton Kelly. There is something new in zoos in San Diego, and for 20 cents you can find out what it is. Address the Society at Box 551, San Diego 12, California.

## Refuge Visitors

More than seven and a half million people took advantage, in 1956, of the recreational opportunities offered by America's national wildlife refuges, according to Assistant Secretary of the Interior Ross Leffler. This is an increase of a little more than half a million compared with the previous year's visitation. Fishermen represent a large fraction of the total, and the balance included picnickers, swimmers, boating enthusiasts, photographers, and Nature students. At Aransas and Santa Ana refuges in Texas, all the visitors were attracted by the opportunity for wildlife observation, and some 15,000 at Aransas made use of the new observation tower for close-up peeks at the whooping cranes.

## State Park Attendance

Campers and picnickers at America's State parks who find themselves competing for campsites and places to sit for sandwiches and coffee have only to read statistics recently released by the National Park Service to understand the reason for their predicament. The Park Service compiles reports from State park agencies, and its publication *State Park Statistics—1956* shows a record two hundred and one million visitations to State parks last year, 9 percent more than 1955. It reveals, also, that 81 percent of the total funds expended for new park land was made by only four States—California, Massachusetts, New Jersey and New York—and that two-thirds of all money for park improvements was spent by seven of the 47 reporting States.

## Visitor Aid

Visitors to the Chicago Natural History Museum may now assist themselves to a fuller interpretation of what they see in the exhibition halls of the department of zoology, through the use of a new key exhibit called "The Animal Kingdom." Inspecting this exhibit, the visitor learns of the phyla, or large groups, into which the zoologist fits every kind of animal life, and how the phyla are broken down into subdivisions. Through the use of action correlated with subjects, the visitor learns about his animal relations, and how he fits in with them. The exhibit was prepared by a team of scientists, artists, taxidermists and technicians under the supervision of Dr. Austin L. Rand, chief curator of zoology.

### Director Resigns

James A. Hutchison, O.B.E., director of the Canadian National Parks, closed a long career of service to national parks and forestry in Canada on his retirement on August 15. Born in Fordwich, Ontario, Mr. Hutchison joined the Canadian Department of Interior in 1912 as a forest ranger. Mr. Hutchison's successor is Mr. J. R. B. Coleman, who was chief of the Canadian National Parks Service and who also has had a long career in forestry and the National Park Service.

### Wildlife Refuge

Holla Bend Island, on the Arkansas River halfway between Little Rock and Fort Smith, has recently been acquired by the Department of the Interior and will be administered by the Fish and Wildlife Service as a National Wildlife Refuge. This 4068-acre island is expected to provide a great wintering area for Canada geese and wild ducks, and has been long sought by the Fish and Wildlife Service. It had previously been a part of the Holla Bend Cutoff flood control project, but was declared surplus by the Corps of Engineers.

### Borneo Preserve

A bulletin of the International Union for the Conservation of Nature in Brussels, Belgium, announces the creation of a ten-square-mile national park on the Bako Peninsula of Sarawak, a colony of the British Commonwealth in northern Borneo. Bako National Park will preserve a great diversity of vegetation, including varieties of insectivorous plants and examples of luxurious epiphytes—plants that dwell on other plants without parasitizing them. A well-equipped rest house is available to tourists and visitors to the preserve.

### Lucky Albacore

The California Department of Fish and Game notes that an albacore, caught and tagged July 25, 1955, was recently caught off the coast of Lower California 710 days after its liberation, setting a new record for albacore "freedom." Earlier, another albacore that had been tagged off Monterey, California, was taken off the coast of Japan, 145 miles east of Tokyo. The Department says that an albacore may show up in the waters of any given fishing locality for at least three years in succession.

### Useful New Products

For the budding astronomer, Edmund Scientific Company of Barrington, New Jersey, has a new three-inch astronomical reflecting telescope, of 60 and 120 power, engineered for clear definition and resolution, with equatorial mount, optical finder telescope, star chart and 272-page astronomy book, a mighty fine Christmas present for \$29.50. . . Fred Arbogast Company of Akron 3, Ohio, the artificial baitmakers, are marketing a new series of baits called the Hula Jigs, for those growing numbers of jig-fishermen, and will be glad to send more information on receipt of a letter to them at 313 W. North Street. . . Peerless Maid plastics division of Monsanto Chemical Company has developed a new leak-proof vinyl plastic car litter bag that might save the unthinking autoist from a stiff fine for an investment of about 59 cents; it is called Car Litter Bag, and can be bought at F. W. Woolworth stores. . . A new metallic material known as Brill-Metal, for making unusual Christmas cards as well as tree ornaments in three dimensions, and easily cut to various sizes and shapes is being introduced by Cleveland Crafts Company, 4707 Euclid Avenue, Cleveland 3, Ohio, with a Christmas card design kit. . . And for the fellow who can look ahead, next year's garden can be enriched with compost made by the new Gardener's Friend Composter, in which the gardener can produce up to 5000 pounds of compost yearly for bigger and tastier crops; the price is \$39.50, and information is available from O. E. Zimmerman of Fairfax, Minnesota.

### Solar Heating

Engineers, architects and designers the world over long have been at work on the problem of efficient conversion of solar energy for home-warming in regions blessed with sustained periods of sunshine. This year, more than 1500 architects and designers from 32 nations have entered the 1957 solar house architectural competition sponsored by the Association for Applied Solar Energy, of Phoenix, Arizona, and the Phoenix Association of Home Builders. A jury of eminent architects will determine the winning design, which will be rewarded with a prize of \$2500 and a contract for the architectural work on the residence, to be built on a site ten miles northeast of Phoenix.

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# Nature AND THE MICROSCOPE

By JULIAN D. CORRINGTON

## Silken Treasure

LONG BEFORE THE opening days of Western civilization, the ancient Chinese had mastered the art of raising silkworms and of preparing and weaving their cocoon fibers into fine and lustrous garments. All through history the costumes of upper-class Chinese, resplendent in design and color, and aglow with the brilliant sheen of silk, have been the admiration and the envy of textile makers everywhere, and many of them are now highly valued as museum pieces.

Secrets of sericulture—the propagation of silkworms—were closely guarded, but eventually leaked through to the West and the business became established principally in France, where silk manufacture became a major industry. Students of biology are familiar with the story of how Pasteur, in the middle of the last century, saved this great national asset by solving the problem of *pebrine*, a destructive disease of silkworms. Today, in spite of the rise to prominence of synthetic fibers, as Nylon, Orlon, and the several forms of Rayon, real silk holds its preeminence; often it is employed in combination with one or another of its rivals, as seen in our photomicrograph of a textile woven of silk and Orlon.

When the word *silk* is unqualified,



Fabric of silk (vertical) and Orlon (horizontal) fibers, 140X.

it always refers to the product of a single species of silkworm, the one and only *Bombyx mori*, far superior in quality and utility as a textile fiber to those from other species. The original home of this insect is supposed to have been China, but it has been domesticated for so many thousands of years, and taken by man from place to place to such an extent that it is no longer known in the wild state. The adult, or silk moth, belongs to the family Bombycidae and is rather ordinary in appearance—wingspread about one and one-half inches and body yellowish in hue. But because of its life cycle, with its inclusion of the all-important cocoon stage, it is second only to the honeybee as the world's most famous and valuable insect. The silk "worm" is, of course, not a true worm at all, but a caterpillar. The colloquial name "silkworm" is thus of a kind with armyworm, cutworm, fireworm, and a host of others that designate larvae in the Lepidoptera.

## Feed on mulberry

When eggs laid by the female moth hatch into tiny caterpillars, they are fed on leaves of the white mulberry, *Morus alba*, less preferably one of the other mulberries, or the Osage orange, and so sericulture must also embrace mulberry culture. The larvae eat prodigiously, and grow and mature, like all members of their tribe. When full grown they are ready to pupate, and now comes the spinning of the silken cocoon within which the caterpillar will slowly metamorphose into the winged moth. This cocoon-making is the final fruition for which the endless care and trouble and outlay of funds of the human servitors have been performed. A certain number of the pupae must, to be sure, be allowed to carry on and produce adult moths of both sexes so as to have fertile eggs for the next generation, but the great majority are sacrificed in order that milady may have her silk stockings and milord his silk shirts.

There are other silk moths, all of them inferior in the quality of the



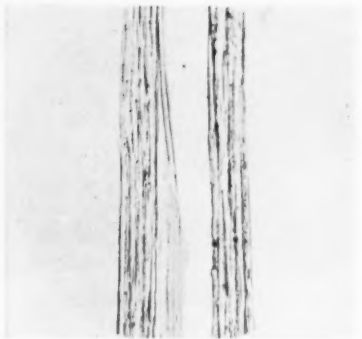
Degummed silk fibers, 200X.

fiber excreted. In the family Saturniidae, which includes such familiar forms as our large American Io, Cecropia, Polyphemus, and Luna moths, there is the Tussah Silkworm, *Antheraea mylitta*, (India), *A. yamamai* (Japan), and others in China. Many attempts have been made to utilize one or more of the cocoons of American species, but all have failed. *Bombyx mori* yields to no competitors.

In proportion to the enormous value of the world's silk industry has been the volume of research upon every aspect of the commodity. Studies have been made, and will continue, on everything that affects the welfare of the insect throughout its life cycle, and on the mulberry tree; diseases and pests, most suitable environmental conditions, and factors influencing productivity, just as is done with beef cattle or with corn. There have been wars, murders, and cloak-and-dagger diplomacy galore over the trade in silk; there have been hijackings of trucks laden with bolts of the valuable stuff, with consequent power alignments in gangland. Big money is involved, and so all of these excrescences of civilization follow as a matter of course, with the inevitable political corruptions, bribes, and reprisals. Indeed, the story of silk, the glamor textile, can be written in whatever fashion one desires, from sober statistical figures to sensational romances.

Researches on the fibers themselves and on methods of spinning, weaving, dyeing and other treatments take us from the realm of natural history into modern chemistry, physics, and engineering. There follow economic problems that also require high-powered investigations into manufacturing, labor, marketing, ad-





Raw silk. Two strands of 5 or 6 fibers each, 150X.

vertising, legal, and international problems, so that the ramifications started in all innocence by the little caterpillar when he spins his encasement are endless.

#### How it comes about

Let us turn now to the way in which this progenitor of problems and of wealth gets the show on the road. The silk glands are a pair of long and thick-walled tubes that run down the sides of the caterpillar's body. The two ducts open by a common pore, the seripositor or spinneret, on the lower lip or labium. As the larva approaches maturity, these glands become swollen with a clear and viscous fluid that will harden immediately upon exposure to air. The liquid is discharged from both glands simultaneously, and thus forms a silken fiber that is composed of two filaments, side by side, each about one twelve-hundredths of an inch in diameter, roughly triangular in section, and anywhere from 800 to 1200 yards long! If the two filaments, one from each gland, were joined end to end they would thus exceed a mile in length, seemingly an impossible accomplishment for one small caterpillar. Rotating its head in clock-like regularity for about three days, the larva wraps itself round and round in the silk to make a cocoon whose protective capacities are admirable.

The vicissitudes of the weather, and such predators as other kinds of insects, spiders, and birds, are successfully resisted. But man, the great destroyer, has learned how to circumvent all this careful provision for the safety of the pupa, and drops the cocoons into a boiling soap solution, whereupon the binding material is dissolved and the two filaments are separately unwound onto a reel. Often the outer fibers of the

cocoon are short and loose, and must be removed before the main fiber can be reeled off; they constitute *floss silk*. Warm water alone will soften the cocoon so that unreeling may commence, and the product thus obtained is *raw silk*, containing twenty to thirty per cent of *sericin* or silk glue, the remainder being the fiber proper, composed of *fibroin*. Raw silk is harsh and stiff, a dirty yellowish-white, and quite unsuited for textile manufacture. *Ecreu silk* is brownish and harsh, with only about five per cent of the *sericin* removed. When all of the binding material is dissolved, the fiber is termed *boiled-off* or *degummed silk*, and is fine, soft, white, and lustrous. *Souple silk* is that which has been further treated with cream of tartar, causing the fibers to swell and become more absorbent, thus aiding the dyeing process.

Sericin is not yet thoroughly understood, but is known to contain a number of amino acids, the building blocks of proteins. The composition of fibroin is also imperfectly analyzed, in spite of all the research done on it, though better known than sericin. Some ten amino acids are present, and one calculator of the molecular weight reported the fantastic figure of 217,700, indicating that silk, apparently a simple and homogeneous fiber, is anything but simple chemi-



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cally. X-ray diffraction pictures have shown that long polypeptide chains are arranged to conform with the long axis of the fiber; in fact, it is this construction that makes a fiber a fiber, and gives it great tensile strength.

Silk in general is produced by numerous insects, by spiders, and by mussels. A piece of fabric was once woven from the byssal threads of *Pinna*, a large bivalve, which uses



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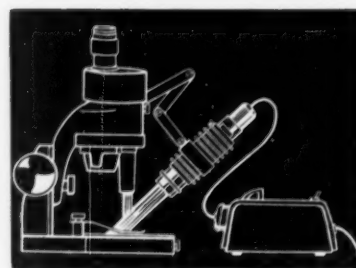


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its silken threads for attachment. Spider silk—ah, but that is another story altogether, and one that will have to await a future installment.

Meanwhile, the student of microscopy can collect a cocoon of one of our American species and obtain raw silk fibers. By untwisting a short length of silk thread he can obtain a

single fiber of degummed silk, and make mounts of both of these as well as of thread and of various fabrics, comparing silk with other textiles. The single silk filament is structureless under the microscope, with no internal details at all, thereby differing from other fibers, as wool or linen.



AO's versatile Illuminator

## Versatile Lamp

**F**EATURED instrument for this month is American Optical Company's No. 353 Universal Microscope Illuminator. The illustration tells the story of the wide range in adaptability of this ingenious lamp, which can be used with all forms of laboratory compound microscopes, with widefield binoculars, and for the examination of either transparent or opaque objects.

The illuminator has a stable triangular metal base, above which is a three-link jackknife arm, then the lamp housing. The arm fastens to the base with a pin, readily removed for attachment to either the body or the stage of binocular microscopes. Maximum elevation above the work table is 8½ inches and, when equipped with an accessory optical bench the lamp lies flat for direct focusing on the substage mirror.

The bulb is a 6.5 volt, 2.75 ampere, single-filament, clear glass type, with a double contact bayonet base. Its socket is held in the housing by a thumb screw, easily removable for replacements. The variable transformer controls the voltage from 4 to 7.5, giving a considerable range in light intensity. The optics consist of a three-element condensing system in a spiral focusing mount, which also supports either an iris diaphragm or a cap filter holder, interchangeable as desired. The iris mount itself accommodates filter discs when these are to be used in combination with a diaphragm, as in Kohler illumination.

Filters supplied as accessories, according to the needs of users, include blue glass, heat-absorbing glass, ground glass, neutral density filters of 5%, 25%, and 50% transmission, green filter and yellow filter. Certainly versatility is the keynote of this fine laboratory aid. For price lists of the lamp and its accessories write to the American Optical Company, Instrument Division, Buffalo, N. Y.

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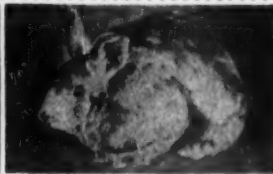
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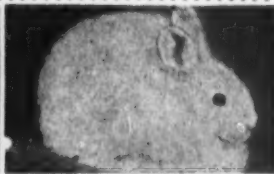
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